The Builder.

VOL. XXIV.—No. 1208.

The Aberdeen Granite Works.

ABERDEEN has long been celebrated for the production of granite. What coals are at Newcastle,—what copper is at Swansea, or Portland stone in the Isle of Wight,—so is granite in the city and seaport of Aberdeen. It is, in fact, a staple commodity. Not only is Aberdeen built of granite,—as we recently had occasion to describe,—but the produce of its quarries forms a valuable article of local exportation. Other towns which are situated on the great central chain of the granite mountains of the British Islands may compete with Aberdeen in the production of granite cubes and foundation blocks, but we doubt if they equal it in artistic work.

During a recent visit to the granite city, we had the opportunity of inspecting two or three of the largest granite works, and, in particular, we devoted considerable attention to the manufactory of Messrs. Macdonald & Field, who, we believe, are entitled to be regarded as the earliest as well as the largest producers in this remarkable branch of trade; and of these works we now propose to give some account. We shall preface our description with a few notes on the history of granite in its relations to art.

The first idea of employing the refractory but enduring material of granite in sculpture and architecture is due, so far as we know, to the ancient Egyptians. In this art, as in everything else to which they applied their genius, they attained a high degree of excellence. Those who have examined their colossal buildings, and the equally colossal effigies of their gods, must admit the precision with which their figures and ornaments are cut, and the delicacy of detail in the designs with which their architecture is enriched. The hieroglyphics on their obelisks and other granite monuments are sculptured with a minuteness and finish which cannot fail to surprise the beholder, even supposing they had used steel as highly tempered as our own. But it is believed that their tools were composed of bronze. Specimens of their sculpture in granite, which have for 3,000 years resisted the action of the elements and the far more destructive influences of barbarous invaders, still astonish us by the high polish of their surfaces, and the delicate finish of their details. Even a visit to the Egyptian Saloon of the British Museum will at once prove that there are great accuracy of muscular delineation, and great skill exhibited in the communication of what we may describe as fleshiness to the lips and features of some of the figures there preserved. The Egyptians, in short, evinced a high degree of skill in the art of sculpture in a material of the most imperishable kind,—and one, we must add, on which few succeeding artists have ventured to employ the chisel.

In modern times the fabrication of slabs, pedestals, and vases, in hard porphyries and in granites, has been carried to great perfection in Sweden. The quarries of Blyberg, at Elfdalen, for many years have furnished materials for the exhibition of this Swedish ingenuity and artistic skill. The elegant forms and high finish of their works in those refractory materials have contributed greatly to the splendour of the Swedish capital, and are known and admired over Europe. Some of the principal buildings of St. Petersburg are also of granite. Nevertheless, though our own mountains yield no less beautiful and durable materials, it is surprising how long we remained without any attempt to apply them to the purposes of ornamental art. It is true that, among the granite buildings of Aberdeen, symptoms might be observed of the artistic capacity of the material. Waterloo Bridge had furnished a good specimen of construction, and now and then blocks of Cornish granite had begun to appear in the pedestals of a few statues in some of our principal towns. But the idea of giving a polish equal to that of Egyptian syenite or Carrara marble to our native granite,—of applying the principles of formative art in works of considerable size,—of introducing this splendid material as a decorative feature in our halls and saloons,—and, finally, of employing it as lasting memorials of departed genius and worth in our cemeteries,—seems due to a citizen of Aberdeen, the late Mr. Alexander Macdonald, who contrived to solve the difficult problems about the year 1822.

The fabrication of granite into works of decorative construction has, in consequence, been a distinct business for upwards of forty years in Aberdeen; and, from a small beginning, has become one of the most important branches of industry in the north of Scotland. It now employs probably 2,000 persons in the production of material, and in its manufacture; and, as the trade is further developed, it will doubtless employ as many more.*

The first thing that strikes the visitor is the enormous masses of raw material; that is to say, of huge blocks of different kinds of granite which lie scattered about. These have been reft from their native beds, and brought round from Peterhead by coasting-vessels, or from the other inland quarries by railway, a branch line from which passes into the yard. Here we may observe and contrast the well-known greyish white granite of Rubislaw with the rich red hues of the Peterhead quarries. There are delicate pink shades from Stirling Hill; a slate-coloured variety from Pitsligo; together with the full, delicious blues from Cairngall and Sclathie. Of course, these diversified hues and delicate tints do not show well in the blocks; nor, indeed, until after the final process of polishing can we fully understand the beauty which is hid in those masses of rugged rock.

The granite-yard has a remarkably clean and orderly appearance. The machinery, including the steam-engine, is very complete, and some of it, as we shall see, very curious. A travelling crane of great power is a conspicuous object in the sky-line; and here and there we may see sundry lorries and four-wheeled carriages mounted on miniature railways, for transporting blocks through the works during the various operations to which they are subjected.

The first operation we shall describe is the sawing process. Granite is cut into thin slabs, by means of saws set in iron framework. But this is a tedious and expensive operation, very different from going through a block of marble. In the sawing-room several blocks were then under the machines, which are worked, of course, by a steam-engine. We observed one block, 10 ft. long, being cut into six or eight slabs. The saws are, as usual in such works, of soft iron plates, secured in a frame, and operate on the stone by means of quartz sand and water, applied as in slicing marble. No emery is requisite in these operations, the particles of silicious sand being sufficient to cut the quartz, which is pure silica, and the hardest mineral in the granite. Frequently fourteen saws are used in a single frame; and occasionally they have had as many as eighteen employed at once on a single block. The progress of the work, of course, is slow; indeed, it requires a whole day to cut a groove two-thirds of an inch in depth in the granite. Owing to the expense of this sawing process, granite slabs have not, as in the case of chimney-pieces, for example, been able to compete with or to supersede the slabs which are cut from softer materials.

We now come to the process of rough-hewing and shaping the blocks to the prescribed model; that is, of cubical prismatic or cylindrical and other curved forms. This is technically termed "first dressing," and is performed by hand-picks with short handles, and heads about four pounds in weight, which the workmen from long habit wield with surprising dexterity. The surfaces are then reduced to a regular form by means of steel punches and chisels struck by iron mallets. The chisels require a particular temper, which must be neither very hard nor very soft, else they would either lose their edge by chipping or fail to cut the stone. We observed that they frequently require sharpening in the more delicate kinds of work. The chisel is held by the workman at a much less oblique angle to the surface of the block than it is when working freestone, and he separates only small particles at a time.

Indeed, the whole process of the fabrication of granite consists in punching the obdurate blocks with thick heavy conical punches and wedge-like chisels (not such chisels as are used on freestone, and certainly not such as are used for limestones) either struck by heavy iron hammers or used in the form of a pick. This process, we must say, is most laborious, and very different indeed from the easy operations one may see going on in the yard of a London mason. Attempts to apply machinery to the dressing of granite have been often made; but, as we might expect, without success; for it requires a distinct and heavy blow to separate the particles of stone in beginning to work it. It is also impossible to work granite on a turning-lathe; but all circular forms are wrought as true by the hand as they could be on the lathe. The truth is, we suspect, that the process of hewing granite, like that of baking bread, is a radical process—incapable of improvement; and is much the same in the present day as it was in the days of the Pharaohs.

The next operation is termed "Fine-axing or dressing." This was formerly effected by means of picks, or iron hammers, pointed at each end. But these instruments are now replaced by solid shear or cast steel, tempered to the proper degree, the manipulations of which leave the surface out of "thraw" (twist), but still comparatively rough. The finer surfaces are made by means of the single and double axe; and for joints and mouldings, steel chisels and punches of various sizes are used. The "double axe" is a framework of iron, containing at each end about half a dozen steel blades, forming in combination a dressing-surface of about 3 in. by 1 in. It leaves the stone in the finest state of dressing possible, presenting the appearance of chased metal work. In fact, this fine-axing is neither more nor less than a sort of granite chasing. Very pleasing effects can be made in this way by the contrast of the polished and axed surfaces, as the rich natural colour of the granite only comes out in polishing, while the dressing always displays a good background. Many architectural features can be rendered in a telling manner by this arrangement,—such as scrolls,

* The present Mr. Macdonald is a son of the projector; and his partner, Mr. Field, is a junior branch, or rather offshoot, of the well-known engineering firm of Maudslay & Field.

coats of arms, panels, and many other forms in ornamental and decorative art.

The next process is by far the most important of the series,—that is, the process of polishing. Here the most curious part of the machinery comes into play; and it is easy to detect, even on a superficial survey of the immense polishing sheds, that there are different sorts of machines in use for all the different forms of granite. The *rationale* of the process is, however, essentially the same. Indeed, granite is polished on precisely the same principles as slate, glass, or precious stones,—that is to say, by the use of ingredients of different and progressive value in mineralogical hardness. In polishing plane surfaces, concentric grinders of iron are used in various machines, applied to the surface of the stone, first with sand and water, next with emery; and then for the iron grinders are substituted certain discs covered with leather, or a substance termed "lapp," freely supplied with the oxide of tin, which is the polishing ingredient better known to our readers, perhaps, as putty powder. All circular forms, such as *stelæ*, the frustra of columns, pedestals for busts, vases, and the like, are fixed in well-contrived lathes, whirled round by the machinery; while the sand and emery are applied to their surfaces by means of fine thick plates or bars of iron, of a corresponding outline, termed polishers, which the surface of the granite must constantly traverse. We saw a large Etruscan vase, about 3 ft. in diameter, just prepared for the process of polishing, its graceful curves accurately cut by the chisel, and the iron bars, 1 in. or 1¼ in. in thickness, neatly forged to its various curves, lying beside it, ready to be applied when it was fixed to the lathe. In this way columns 30 ft. in length and vases 15 ft. in diameter are polished on precisely the same principle as small pillars. Mouldings, after being properly set in plaster of Paris, are polished by means of cast-iron planes, fitted to their curves. These are applied by the lateral motion of a series of the most odd-looking machines we ever saw, which are, naturally enough perhaps, called "rubbers," but which would be more appropriately described as pokers! Certain concave and convex surfaces have to be polished by hand, such as the groundwork of ornament and any minute sunk work or entaglios. In all these cases, however, the polishing materials are the same;—first, silicious sand is interposed, then emery of various degrees of fineness, and finally the "lapp," or fibrous polisher, with the putty powder, is used until the requisite lustre is obtained. The granite has now assumed that beautiful glass-like surface which we know it will retain long after the finest polished marble has become dim, or (if exposed to the atmosphere) has already begun to decay. We break off for the present.

BERLIN IN THE NINETEENTH CENTURY.

IN an architectural point of view the capital of Prussia has always been a long way behind other European cities of much less importance, size, and population. For centuries the residence of the Hohenzollern dynasty, as Electors of Brandenburg, was surrounded by the unpretending dwellings of impoverished citizens, working artisans, and half-peasants, who congregated together from the surrounding flat and open country for the sake of shelter, and the security afforded by the walls of Berlin against the lawlessness and rapine of the feudal chiefs and their retainers in those troublesome times when might took the place of right. Even under Frederick the Great no impetus was given to embellishing the capital; for, though that monarch occasionally resided in his palace there, he spent the greater part of his reign at his favourite residence of Sanssouci, at Potsdam, where he also died. In fact, where Nature has done so little, there was no inducement for Art to stretch out her hand, and it was but an unthankful effort to embellish a city with handsome and expensive buildings where the inhabitants were content to dwell in cheap and ugly houses, as their forefathers had done before them.

It was only since the peace of 1815 that the spirit of improvement first became visible at Berlin, and even then only with the aristocracy, who saw the necessity of providing themselves with suitable palaces in the capital of the greatly enlarged but not yet consolidated monarchy, and this gave rise to the erection of many extensive and convenient mansions, though confined to a very small locality, as the Wilhelmstrasse, the Belle-Alliance-Platz, and Unter-den-Linden.

The credit of becoming the regenerator of Berlin is fairly due to the late King Frederick William IV., who, whatever history may say to his disparagement as a weak-minded statesman and inconsistent politician, was certainly a man of good taste, and fond of aiding genius in painting, sculpture, architecture, and manufactures. During his reign the Bourgeoisie, which had till then been considered as a distinct and inferior class, began to make money and feel that they collectively formed an important element in the state; they therefore began to spread themselves out and build dwellings affording greater convenience and more space, air, and light than they had till then enjoyed.

But it was the Revolution of 1848 that gave the greatest impetus to this spirit of development and progress. With the knowledge and belief that all Prussians are equal in the eye of the law, the lower classes evinced a most wonderful sagacity in appreciating the advantages of education and the value of skilled labour, which was further enhanced and confirmed by the blessings of free-trade, then just dawning on their hitherto benighted senses. Building thus became a trade, and such a lucrative one that new quarters were laid out in the suburbs outside the gates of the city and immediately covered with rows and streets of handsome new houses, and studded with detached villas standing in their own grounds. To the north and west of the city was an extensive district of waste land, in former times a dense forest, and still called the Thiergarten, or Deer Park. This was eminently adapted for suburban or half-country villas, and has been used for that purpose accordingly, the gardens extending back to the banks of the Spree, which bounds it on the north. But not only was this rage for building confined to the suburbs, it penetrated to the very heart of Berlin. The noble avenue called "Unter den Linden," extending from the Brandenburg Gate at the west to the Royal Palace, saw its old shabby houses disappear one by one, to be replaced by noble mansions, till they have now become a street of palaces, interspersed with a dozen of the principal hotels for the accommodation of the travelling public. In this part of the town,—called the Friedrichstadt, in honour of the royal dynasty,—many new streets were laid out and soon built on, among which is the Friedrichstrasse, running north and south in a straight line for more than a mile and a half, and crossing the Leipzigerstrasse and Unter den Linden at right angles.

In the meantime the public buildings were by no means neglected. It was during this period that the genius of the late architect Schinkel began to shine conspicuously, who erected some of the most beautiful objects that now adorn Berlin, and have tended to confer on the Prussian metropolis the proud name of "Spree-Athen," or Athens on the Spree. Amongst these efforts of Schinkel's genius are the new Museum, the beautiful head-guardhouse in a very pure Doric style of architecture, and the Palace of the Prince (now King) of Prussia. Of the more modern public buildings, the Rathshaus, or Guildhall, is of more colossal proportion than remarkable for the good taste of its architecture, but gives proof of the importance of the municipality of the capital. The new synagogue is a monument of the emancipation of the Jews, and a striking manifestation of the great wealth they have achieved, and the independent position obtained by them under the present liberal system, inaugurated during the nineteenth century. The handsome appearance of the new Berlin Exchange must be familiar to most of our readers, from the beautifully-executed model which formed such a striking feature of the great nave in the International Exhibition of 1862. It is now completed, and may be considered as a significant proof of the flourishing state of the home trade and foreign commerce of Berlin, as the building is erected entirely by voluntary contributions from the mercantile and manufacturing classes.

Among the most recent erections may be mentioned the Wallner Theatre. Its architect, Herr Titz, is not considered a great genius by the rest of the fraternity; but it cannot be denied that he has evinced considerable talent for the composition of designs for buildings on a large scale, and more especially for theatres, in which branch of architecture he has had much experience and a decided success. The Wallner Theatre in architectural design is a work of good taste, and presents an elegant and pleasing appearance viewed from the outside, or with reference to the interior arrangements and general fitting up of the ornamental parts; but complaints are general of its suffering from two imperfections, viz., that it admits everywhere cold draughts of air, and that sufficient attention has not been paid to the principles of acoustics; for, in some parts of the house, the spectators are unable to hear what is going on on the stage.

A striking object in the new quarter called the Köpnicker-Feld, is the new Turn-halle, or hall for gymnastics, erected by the municipality at a cost of 120,000 dollars (about 17,000*l.*), from the designs of Herr Gerstenberg, the city architect. It presents an imposing frontage of 270 ft. in the Prinzenstrasse, by a depth of 70 ft., and is probably the largest hall of the kind in existence, having sufficient accommodation for 600 "turners" to go through their gymnastic evolutions at the same time. 15 ft. from the ground galleries, open to the public, run round the interior of the hall, access to which is obtained by staircases on each side of the entrance porch in the centre of the building. Two side wings are added, the ends of which protruding beyond the line of the principal façade, give the building, with the central porch, somewhat the character of the Elizabethan period. In the same quarter is the club-house of the Association of Handworkers or Artisans, built by Messrs. Kolscher and Lauenburg, and much admired on account of the good taste displayed in its ornaments. Near this is situated the Wilhelm's gymnasium, a high-school endowed by his present Majesty, and built by the King's Court Councillor for Architecture (Hofbaurath) Lohse. It is a building of imposing appearance, with a frontage of 204 ft. and a depth of 77½ ft. The height of the whole, including a handsome stone balustrade that surrounds the flat roof, is 73 ft. In the centre of the principal front (in the Victoria Strasse) is a risalite ornamented with Corinthian columns. The building contains two stories, with ground-floor and basement. The class-rooms are 29 ft. long, 20 ft. broad, and 14 ft. high, and are mostly on the ground-floor. The saloon for the drawing class is on the first-floor, with a north aspect, and its dimensions are 74 ft. length, 18 ft. breadth, and 16 ft. height. On the opposite side is the library, with the same proportions. The great aula, or hall for lectures, is on the same floor; it is 75 ft. in length, 41 ft. in width, and 30 ft. in height.

With regard to the private mansions that have sprung into existence within the last few years, their name is legion, and having all more or less claim to architectural beauty, it would be an endless task to particularise them; but without wishing to make any invidious distinctions, we may be permitted to mention a few of those of the most striking character and appearance. These are the mansion of the banker, Herr Krause, in the diplomatic part of the Wilhelmstrasse, crowned by a beautiful roof in the Renaissance style; the corner house of the Bellevue-strasse, No. 10, belonging to Herr Gerson, executed in the ornamental villa style, though the ground-floor is occupied by spacious and airy shops (Mr. Gerson's establishment being the Swan & Edgar of Berlin, and the crowded resort of the *beau monde* of the Prussian capital); and finally, the residence and studio of the sculptor, Herr Sussmann-Hellborn, in the Hohenzollernstrasse, built from his own designs—the architectural ornamentation being executed in sandstone, from the drawings of Herr von der Hude, in a style closely approaching the Renaissance.

SIENA.

IT is painful for any true lover of art to see how little is known of one of Italy's most artistic towns—Siena; and, indeed, a bad and dirty hotel goes far to make a most interesting place disagreeable. Situated on the brow of a hill, Siena affords such lovely Italian views as Turner must have often gazed upon, sighing that even his immortal pencil could but feebly render the glorious tints which the setting sun throws on the distant mountains, tinging them with that dusty, rosy, violet hue so sympathetic to the eye. Birthplace it is, too, of Razzi, an artist who often rivals, if he does not surpass, Raffaelle in his beauteous contours, and the heads of whose figures show much of the strength of his master, Leonardo da Vinci; yet of him,

as of his native town, little is known, for two reasons,—1. That, having painted principally in fresco, his works are stationary; 2. That Vasari, in whose wake most other writers on the same subject have followed, not being able to separate the immoral man from the noble artist, has not acknowledged his merit. No one, however, who looks at a work of his attentively, can fail to perceive that the labour of a mighty intellect is before him. Take, for example, a fresco of his, which, sawn from the wall of the church of San Francesco, now hangs in the Sienese Gallery of the Belle Arti,—the life-size, half-length figure of Christ bound to the column. Through the centre of the picture rises a veined marble column; and with His back to this, but slightly on the right of it, our Saviour stands bound; while behind the pillar, and a little above His head, an arch, supported by two pilasters, enchapels the figure, and by its sweeping curve sets off the lesser ones of the head and its surrounding glory. The head is inclined towards the left, as also the look, which is slightly downward. A profusion of dark chesnut-coloured hair falls in long disordered ringlets on the shoulders, enshrining a face where majesty and meekness, pity for those who are giving him pain, Godlike beauty, and human fatigue are all mingled; while the eyes,—eyes such as Razzi only could depict,—seem gazing forward with sorrow on future sins, which their present tears are expiating. Drops of blood, too, are on that noble brow flowing from beneath a crown of thorns, which makes the kingly head it lacerates even more majestic. The parted lips show that grief and pain have done their part, but the clustering moustache and beard that there is human strength to support the divine spirit until its enemies have done their worst. The torso is worthy of the head, and the whole rich with the lovely colours to which Siena gives the name. From the clouds in the blue sky in the background there break forth rays of light—the light of promise. How much better would it be if such subjects were treated only by such men as Razzi. In the Uffizi gallery at Florence is a Saint Sebastian by him, one of the very few pictures that treat the subject of his martyrdom at all worthily. At Pisa, in the cathedral, is the Sacrifice of Isaac by him; but it is impossible to judge of his wondrous talent without going to Siena and seeing the frescoes of the Fainting of St. Catherine in San Domenico, where the saint patroness of the town (whom the inhabitants hold in even greater veneration than the Virgin Mary) has fainted, and is supported by two other nuns. The descent of Christ into Limbo contains a figure of Eve of surpassing beauty; and in the chapel of S. Bernardino there are several splendid frescoes, as also in the Palazzo della Communità. And when Razzi was, for his bad behaviour, exiled from Siena, the monks of a convent called Monte Oliveto, about five miles off, gave him refuge, and in return he painted their cloisters; and the monks are still, with reason, proud of so splendid an acknowledgment of their order's charity in former days.

R. W. SPRANGER.

DURHAM.

IF a bitterly cold day, with alternating sleet and sunshine, could enhance the pleasure of a day in Durham, I have enjoyed it. Despite, however, of occasional overshadowing, and the accompaniment of a most unmusical cutting northern wind, the sky was clear and blue, and the weather bracing withal. Descending the hill from the railway station, and passing down the Castle Chare, the nearest and narrowest inlet to the town from this side, Framwellgate is entered, and presently the old bridge of that name, originally built by Bishop Flambard, in the eleventh century, is reached. Looking up from this spot two objects stand out prominently before you, the grey and grim old castle, and the greater and more grand cathedral, similarly situated on a rocky altitude, its walls and western towers overhanging the river.

The neighbourhood of Framwellgate is rather the lowest and least respectable quarter of the town, as is evidenced by its appearance. Proceeding up Silver-street, the market-place is neared, forming an irregular quadrangle, and which may be considered the radiating point or centre of the town, from which the principal thoroughfares diverge. Within and around this memorial eyelet of "the ancient city of Durham," there are some objects that invite notice.

The equestrian statue of the Marquis of Londonderry, the work of Signor Monti, erected in 1861, is bold in design and successful in execution. The metal depositing process, or electrotyping, was the method employed in this instance. The statue, though an ornament to the town, still from its position, owing in some measure to the contracted area, and incline of the market-place, is not seen with effect.

Equally noticeable is the handsome public fountain close by, replacing the ancient one called the "Pant." In design and execution it is superior to most of those I have met with in the north, and is admirably adapted to subserve the purposes for which it was constructed. Its ornamentation agreeably harmonises, and even the gilt effigy of Neptune, with his trident, which belonged to its predecessor, though somewhat *outré*, is, perhaps, not altogether out of place, on the score of antiquity and association.

The Town-hall and corporate buildings on the west side of the Market-place present some features, internally, of an ornamental character, which possess a local interest;—wainscoted walls and panelling, on which are blazoned the arms of county families, and stained glass windows, with designed representation of the bishop of the diocese. One of the central lights displays King Edward III., with his barons, thanking the citizens for their loyalty. Suspended coats of arms, and portraits judiciously hung, are made to produce an effect. The old Town-hall, which is reached from the former, is transformed into a police-court, with a police station beneath.

The streets which severally lead from the Market-place, are Claypath, and its continuation Gilesgate on the east; next, Fleshergate and Elvet Bridge, leading to Old Elvet and New Elvet, and Silver-street, through which we entered the Market-place. Gilesgate is a long, irregular thoroughfare, consisting mostly of an assemblage of low-built houses, not very uniform in design, though somewhat kindred in social aspect and stability. It is mostly represented by the shopping interest. There is nothing particularly deserving of notice in this long and straggling thoroughfare, save the old parish church of St. Giles: at the head of the street a very ancient but rather rude specimen of architecture. The square tower is a prominent object, and has undergone additions and emendations at different periods.

The streets bearing the name of Old Elvet and New Elvet contain nothing in any way conspicuous. The former is a respectable quarter, but very lifeless and dull, and the latter is a winding and irregular incline not counterbalanced in the least by its street architecture or general appearance. It branches at its head into two high roads.

At the top of Old Elvet, in an open space on the right, are the County Courts and Gaol,—a low flat building with centre and wings; Tuscan pilasters support the pediment, but on the whole it is a blank, featureless, and forbidding-looking pile, undeserving a note.

I know of no town from its size so well supplied with churches as Durham. There is a perfect glut of them. There are seven parish churches, three Roman Catholic ones, and four belonging to other denominations. Most of these have nothing in particular calling for special remark.

But of churches, all else here of the architect's brain and the craftsman's skill sinks into insignificance before the overwhelming proportions and rude grandeur of Durham Cathedral.

Inside more than outside, as one strays along, bewildered at first sight, through nave, and aisle, and transept, and choir, you feel an oppression of weight upon you; and you must walk, and walk, and gaze, and carefully scan, before you can form an opinion even to satisfy yourself of the stupendous building that encloses you. Above, below, and around, wherever you look, each part is herculanean in conception and construction. Hands have taken from it and hands have added to it, but it is still here; mighty as a whole, gigantic in progressive design and execution.

Look at these massive columnar piers that support the nave on each side: do they not appear more proportionally massive than they need be? Ay, and they alternate in design and ornament as they do also in range; and yet they are made to harmonise, and they do. Furrows cut their shafts, from base to capital, into zig-zag, spiral, and network channelling, and they stand still out in as bold relief, mimicking time as of erst.

But I need not venture into details. In the Lady Chapel Choir, and that portion called "The Nine Altars," the work of later times, yet hardly greater men, much may be seen. The construction of the great central tower has some remarkable peculiarities: the additions of different periods may be plainly traced; and in "The Nine Altars" great irregularities, but with much manifest beauty, are apparent.

The vicissitudes to which Durham was subject during many reigns destroyed much of her monumental as well as her purely architectural splendour. Bishop Hatfield built his own magnificent tomb in the fourteenth century: its canopy since his time has served as a throne for his successors in the cathedral; and it was during his time that the cathedral obtained the beautiful Neville screen, whose delicate fairy-work forms such a conspicuous background to the high altar.

A memorial tablet beside the door of the lady-chapel tells of Sir George Wheeler, the traveller and antiquary of the seventeenth century, and there is a monumental slab, of Robert Neville, in the south aisle: he was once bishop here, in the fifteenth century. Farther east is an altar-tomb of Ralph Lord Neville, said to be the first layman who found repose here. Another altar-tomb of the Nevilles, that of John Lord Neville and his wife, is here, but much defaced, as are others erected in the same times. A modern altar-tomb commemorates Dr. Britton, erected by his pupils: the drapery is well rendered; the pedestal wants fulness.

In the middle transept a marble tablet against the wall commemorates all of the 68th (Durham) Light Infantry who lost their lives during the Russian war. Close by is a very fine statue of Bishop Barrington, in a kneeling posture, by Chantrey. About here are other minor monuments of local interest.

In "The Nine Altars," stands the colossal figure of Bishop Van Mildert, in white marble, executed by our late great sculptor, Gibson. This bishop was the last who wielded the great powers of Prince Palatine. Since his death the great prerogatives of this see have been vested in the crown.

One would linger longer within, communing with the past, where the bones of St. Cuthbert and "the Venerable Bede" repose; but our hurried look must end. The castle is soon reached: the present structure is scarcely older than the eleventh century, but the additions and alterations it has undergone, under the sway of different bishops, has changed its original features. Its position was a well-selected one, with a view to defence; and it may be said that the history of the castle is in part the history of the cathedral and its bishops, for they have for centuries occupied it, altered it, and ruled in it. There is much that will provoke as well as satisfy antiquarian curiosity within its walls, but a description is not my province just now.

Norman architecture is conspicuous all through it. The numerous apartments within the castle are mostly occupied now in connexion with the University. Her Majesty's judges have state apartments here allotted to them.

The University of Durham, the creation of late years, is still an unsuccessful experiment. Many reasons might be adduced as the cause; want of good management for some years, might explain it in part, and the facilities now available, in reaching the old-established universities of the county, and the prizes and the honours connected therewith, may be another reason why the Durham foundation has not thrived. Durham has besides for educational purposes a grammar school, a blue-coat school, a diocesan training college, a training college for young females, and a ragged school.

Durham is also provided with a county hospital and a penitentiary. The hospital appears to have no officially appointed chaplain, but a clergyman connected with the University attends. Why not officially appointed clergymen?

The public wants of the town are catered for in a literary way by an Athenæum and Mechanics' Institute, and reading-rooms. The Institute appears not to be a very thriving concern. To the library of Bishop Cosin, on the Green, admittance is gained by the public under conditions. The Dean and Chapter library and the Queen-street subscription library, are also available in a manner to the public. These, with a School of Art, which I have not seen, and some parochial schools and reading-room, speak pretty well for an inland town like Durham.

The sanitary condition of Durham, though not irreproachable in some spots, bears favourable comparison with other places north. It has

few of those barbarous lanes that disfigure, and which are a disgrace to, such towns as Newcastle and Sunderland. Although the streets are narrow they are kept pretty clean, and the baths and wash-houses in the town are ancillary in their way.

Durham never was fitted by position or shape to be a great emporium of trade, and the railways which of late years opened up other towns and cities and gave them a great manufacturing stimulus, but little disturbed the slow progressive trade of this ancient city. Law, physic, and education, are represented well, as is religion; all in a purely commercial way is small. Though coal-mines are plentiful in and around the county, their existence adds little impetus to those branches of trade that they ought to create and develop.

Some small foundries of iron and brass exist, some flour-mills, a carpet manufactory, and a little is done in the hat, rope, tanned hides, and mustard manufacture. The making and consumption of beer seem to be the best trade,—nearly a hundred public and beer houses attest the fact. Drunkenness is pretty rife in the town, and the magistrates are kept busy betimes in dealing with cases attributable to drink alone.

There is another very tasteful drinking-fountain on the North-road, near the railway viaduct, and convenient to a very steep hill laid out by the kindness of a resident gentleman for public recreation, and called after him Wharton Park. An obelisk erected by the same gentleman is not far off, and, together with an observatory in connexion with the university, adds to the attractiveness of the old city.

Of new building operations or improvements at present Durham exhibits no sign, nor does the city show on its face, as far as I could see, any appearance of extension; nor is it likely, judging by past progress, or present capacity. Notwithstanding her possession of those institutions which have been enumerated, the limit as a town is strangely small and contracted for a place with such a history. In situation Durham has beauty and picturesqueness to a degree even now discernible through the herald shades of spring, that summer will develop; but her fame must live, as it has lived, in the history of her cathedral.

Cities, as well as individuals, possess a commendable pride betimes; may ancient Durham still retain it, and may it lead her to increased activity and prosperity. C. C. H.

THRUST OF GOTHIC ARCHES.

THE theory of the arch has generally been presented in so complicated a form, and in connexion with such intricate formulæ, that practical men have paid very little heed to the investigations of mathematical writers, and have preferred relying on their own experience and sagacity. In a recently published treatise on the arch, by Captain Woodbury, of the United States Engineers, formulæ have been obtained, by which a person having a moderate algebraical knowledge, may calculate the thrust of arches, semicircular, segmental, or elliptical; and may also find the requisite thickness of pier for any given span of arch. A full account of this method, and the mode of applying the formulæ, is given in Fenwick's "Mechanics of Construction." As, however, these books are written more especially for the benefit of engineers, the thrust of Gothic arches is altogether omitted; although any one who thoroughly understands the principles on which the formulæ are deduced for the semicircular arch, will have no difficulty in applying them to the pointed arch, the general method being the same, but requiring modification to meet the peculiarities of the case.

Before proceeding to the case of the pointed arch, I will just refer to the method of investigation adopted for the semicircle. Fig. 1 represents a semicircular arch of thickness CD, with surcharge DG. Then if ABCD is one-half of arch, the thrust of the other half may be represented by the horizontal force N, acting at D. The tendency of the arch is to break up by the sinking of the crown, and the spreading of the haunches, producing an opening of the joints CD, FE, and AB. Let FE be any joint in the haunch of the arch; then, if Px is the moment of the weight of the portion FECD, and its surcharge, taken with respect to E, and y is the vertical distance of the line ND from E, the equation for equilibrium with respect to the joint FE, is $Ny = Px$. Now, the thrust on the different joints will increase as we pass from CD towards AB, until it reaches its maximum, say at FE, when it diminishes from FE to AB.

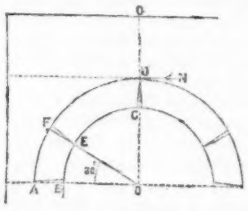


FIG. 1

The above equation having been developed in terms of the angle which the joint FE makes with the horizontal, N can be calculated for different values of that angle until the greatest value of N is found. In the case of the semicircular arch, N is found to be greatest when FE makes an angle of 30° with AO.

I now proceed to deduce formulæ for the thrust of the Gothic arch. Figs. 2, 3, 4, represent the three types of the Gothic arch, and the method of finding the value of Px is as follows:—

Multiply the area of the rectangle HM by the horizontal distance of its centre of gravity from E; add to this the area of CT multiplied by the horizontal distance of its centre of gravity from E; add again the area of the triangle FTO multiplied by the horizontal distance of its centre of gravity from E; then deduct from the sum of these the area of triangle CVO multiplied by the horizontal distance of its centre of gravity from E; and also deduct the area of the sector EOC multiplied by the horizontal distance of its centre of gravity from E. The remainder multiplied by the weight of a cubic foot of masonry gives the value of Px, which divided by YE or y gives the value of N.

The following is the algebraical expression for Px and y as found in the foregoing manner:—

$$
\begin{aligned}
Px = \; & \delta \Big\{ \big(k + h \cdot \sec.\, a + r \cdot \cos.\, a - (r+h) \cdot \cos.\,(a+\theta)\big) \\
& \times \big((r+h)\ \sin.\,(a+\theta) - \tfrac{1}{2} r\big) \\
& \times \big(\tfrac{1}{2}(r-h)\ \sin.\,(a+\theta) - \tfrac{1}{4} r\big) \\
& + \tfrac{1}{2} r^2 \big(r \cdot \cos.\, a - (r+h)\ \cos.\,(a+\theta)\big) \\
& \times \big(\sin.\,(a+\theta) - \tfrac{1}{4}\big) \\
& + \tfrac{1}{2}(r+h)^2 \big(\tfrac{2}{3} r - \tfrac{1}{3} h\big)\ \sin.^2(a+\theta) \cos.\,(a+\theta) \\
& + \tfrac{2}{3} r^3 \sin.\, \tfrac{1}{2}\theta \cdot \sin.\,(a + \tfrac{1}{2}\theta) \\
& + \tfrac{1}{12} r^3 \sin.\, a \cdot \cos.\, a \\
& - \tfrac{1}{2} r^3 \cdot \sin.\,(a+\theta)\ (\theta + \sin.\, a \cdot \cos.\, a) \Big\}
\end{aligned}
$$

$$
y = h \sec.\, a + r\big((\cos.\, a - \cos.\,(a+\theta)\big). \quad N = \frac{Px}{y}
$$

In these equations k=GD, the height of the surcharge; h=FE, the thickness of the arch; r=OE, the radius; δ=weight of 1 cubic foot of masonry of the arch and its surcharge; a=angle COV, θ=angle EOC.

We thus get N the thrust on the joint FE, as soon as we know the value of a and θ. The value of a is given with the particular arch; in fig. 2 it is 15°; in fig. 3, 30°; in fig. 4, 45°. And θ is that value of the angle EOC which gives the greatest value to N, as calculated from the foregoing formulæ; so that, in order to find θ we must give it various values in the foregoing equations, until we find a value which makes N a maximum. This is a very laborious proceeding; and in order to assist the application of the formulæ I have calculated in this way the value of θ or EOC in the three cases which are most generally useful.

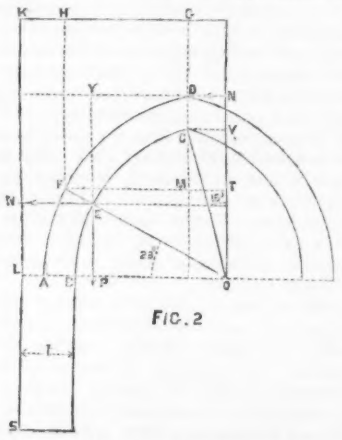


FIG. 2

In fig. 2, the angle EOC=47°, or the angle EOB=28°, which is only 2° lower than in the semicircle, which might be expected from the form of the arch. In fig. 3, I find the angle EOC=44°, and therefore EOB=16°; and in fig. 4, I find EOC=35°, and therefore EOB=10°.

The next thing is to calculate the thickness of the pier or abutment BS necessary to balance the thrust N. To do this, we may suppose, by the laws of mechanics, that the forces N and P act at E, and then proceed to equate their moments taken about the outer edge S of the pier. Then if Q=weight of pier BS, and t its thickness; R=weight of KHFEBL, and c the horizontal distance of its centre of gravity from S; P=the weight of HGCEF, and a the horizontal distance of its centre of gravity from S; N the maximum thrust as calculated previously, b=the vertical distance of the direction EN from S, σ the co-efficient of stability; we have to determine t from the equation,—

$$N b \sigma = Pa + \tfrac{1}{2} Qt + Rc.$$

If we call H the height LS of the pier, then

$$b = H + r \cdot \cos.\,(a+\theta).$$

$$
\begin{aligned}
P = \delta \Big\{ & \Big((r+h)\ \sin.\,(a+\theta) - \tfrac{1}{2} r\Big) \\
& \times \Big(k + h \sec.\, a + r \cdot \cos.\, a - (r+h) \cdot \cos.\,(a+\theta)\Big) \\
& + \tfrac{1}{2} r \Big(r \cdot \cos.\, a - (r+h) \cdot \cos.\,(a+\theta)\Big) \\
& + \tfrac{1}{3}(r+h)^2 \sin.\,(a+\theta) \cdot \cos.\,(a+\theta) \\
& - \tfrac{1}{4} r^2 (2\theta + \cos.\, a) \Big\}
\end{aligned}
$$

$$a = r\big(1 - \sin.\,(a+\theta)\big) + t$$

$$\tfrac{1}{2} Qt = \tfrac{1}{2} \delta \cdot H \cdot t^2$$

$$
\begin{aligned}
Rc = \delta \Big\{ & \tfrac{1}{2}\Big(r + t - (r+h)\ \sin.\,(a+\theta)\Big)^2 \\
& \times \big(r \cdot \cos.\, a + h \cdot \sec.\, a + k\big) \\
& + \tfrac{1}{3}(r+h)^2\Big(r + t - \tfrac{3}{8}(r+h) \cdot \sin.\,(a+\theta)\Big) \\
& \times \sin.\,(a+\theta)\ \cos.\,(a+\theta) \\
& - \tfrac{1}{2} r^2 \cdot \beta (r+t) + \tfrac{1}{3} r^3 \cdot \cos.\,(a+\theta) \Big\}
\end{aligned}
$$

β being the *circular* measure of the angle EOB.

We can now (having calculated these quantities for any particular case), by forming the equation,—

$$N b \sigma = Pa + \tfrac{1}{2} Qt + Rc,$$

obtain a quadratic equation in which t is the only unknown quantity, and which can be solved in the usual manner.

As the above formulæ are rather complicated, and require a knowledge of trigonometry, as well as algebra, for their application, I now proceed to simplify matters by reducing them all for the equilateral arch (fig. 3).

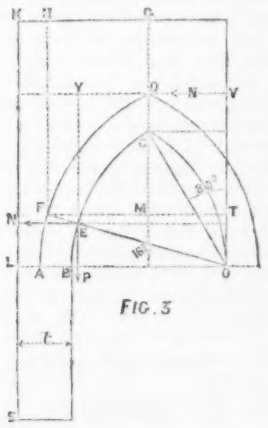


FIG. 3

In this case, $a = 30°$, $\theta = 44°$, $\beta = 16°$.

$$
\begin{aligned}
Px = \delta \Big\{ & k\,(\cdot 10637\, r^2 - \cdot 462\, h^2) + \cdot 01338\, r^3 \\
& + \cdot 12285\, r^2 h - \cdot 27274\, r h^2 - \cdot 4487\, h^3 \Big\}
\end{aligned}
$$

$$y = \cdot 59036\, r + 1 \cdot 155\, h, \quad N = \frac{Px}{y}$$

From these we obtain N in lbs., when δ is given in lbs.

Now to find the equation for t.

$$N b \sigma = 2\ N\ (H + \cdot 27564\, r) = Pa + \tfrac{1}{2} Qt + Rc$$

The *co-efficient of stability* σ, being generally taken as=2.

$$
\begin{aligned}
P = \delta \Big\{ & k\,(\cdot 46126\, r + \cdot 96126\, h) + \cdot 0995\, r^2 + 1 \cdot 1\, rh \\
& + \cdot 9775\, h^2 \Big\}
\end{aligned}
$$

$$a = \cdot 03874\, r + t \qquad \tfrac{1}{2} Qt = \tfrac{1}{2} \delta \cdot H \cdot t^2$$

$$
\begin{aligned}
Rc = \delta \Big\{ & t^2\,(\cdot 5k + \cdot 433\, r + \cdot 577\, h) \\
& + t\,(\cdot 02639 r^2 + \cdot 03874\, rk - \cdot 52275\ rh \\
& - \cdot 9778\ h^2 - \cdot 96126\ hk) \\
& + k\,(\cdot 0075\, r^2 - \cdot 03724\, rh + \cdot 462\, h^2) \\
& + \cdot 00633\, r^3 - \cdot 01332\, r^2 h + \cdot 23487\, rh^2 \\
& + \cdot 4487\ h^3 \Big\}
\end{aligned}
$$

The merest tyro in algebra could calculate these formulæ.

As an example, I will take the equilateral arch when $r = 10$ ft., $h = 2$ ft., $k = 5$ ft., $H = 10$ ft., $\delta = 150$ lbs. Then $Px = 10109{\cdot}4$, $y = 8{\cdot}2136$, $\therefore N = \frac{Px}{y} = 1{,}231$ lb.; $Pa = 3993 + 10280t$, $\frac{1}{2} Qt = 750t^2$; $Rc = 1198t^2 - 2985t + 3888$, $Nb\sigma = 31393$.

Equating, we have to find t from $1948\ t^2 + 7295t - 23512 = 0$; whence $t = 2{\cdot}1$ ft.

If $H = 20$ ft., the equation for t becomes $2698t^2 + 7295t - 48132 = 0$; whence $t = 3$ ft.

The following table gives the value of t calculated from the above formulæ for various values of r, h, k, and H, δ being in all cases taken as 150 lb.:—

Table of minimum Thickness of Pier to balance the Thrust of an equilateral Arch.

No.	*r*	*h*	*k*	*H*	*t*
1	10 ft.	2 ft.	5 ft.	10 ft.	2·1 ft.
2	...	...	...	20 ,,	3·0 ,,
3	20 ,,	3 ,,	10 ,,	20 ,,	5·1 ,,
4	...	...	...	30 ,,	6·3 ,,
5	30 ,,	4 ,,	20 ,,	30 ,,	8·6 ,,
6	...	...	...	40 ,,	9·95 ,,
7	40 ,,	5 ,,	20 ,,	40 ,,	11·03 ,,
8	...	...	...	50 ,,	12·3 ,,

In the arch, fig. 2, the thrust is very much greater for a given *radius*, and the thickness of pier must be proportionally increased.

Calculating the general formulæ with $\alpha = 15°$ and $\beta = 28°$, Nos. 1 and 2 of the table give $t = 3{\cdot}32$ and $t = 5{\cdot}44$; but the *span* in this case is much greater than the *radius*, and when

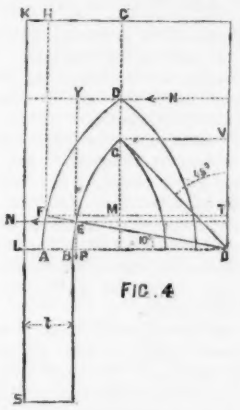


FIG. 4

$r = 10$ ft. the *span* is 14·8 ft. In the arch, fig. 4, the thrust is much less for a given *radius*, and the *span* in this case is less than the *radius*. The results, however, given by the above formulæ, which I have reduced for the equilateral arch, will be found sufficiently near for either of the three cases, provided the *radius* r is always taken as equal to the *span* of the arch for which the calculation has to be made. The same *general* formulæ can be applied to the semicircular arch by making $a = o$, $\theta = 60°$.

I have not taken into account the adhesion of the mortar at the joint FE, for as Captain Woodbury remarks, "in arches of large span, the effect of mortar becomes insensible; and in arches of small span, this effect may reduce the thrust to nothing."

The thrust of the ribs of Gothic vaulting requires to be treated quite distinctly, as they have no surcharge, being loaded only at the haunches. I must reserve the consideration of these for another paper.

E. WYNDHAM TARN, M.A.

MODERN ITALIAN ART.

THE Society for the Encouragement of Fine Art, in Florence, has for some time kept an exhibition open in that city, with a new arrangement, professedly admitting those only who take shares, but *de facto* enforcing nothing else than the simple payment of one franc for entrance, or as many more francs as one may choose to take of these shares so cheaply rated. It is not to be denied that, generally speaking, modern art-exhibitions, as well as modern opera music, in Italy, prove most disappointing, and quite below the high standards created for herself by this classic land. We are accustomed to think of the Italy of the day as in a phase decidedly progressive; but is this verified in her artistic as in other walks of activity? Less so, we believe; and yet we should answer that question in modified affirmative, having received the impression that the impulse and feeling now manifest in this country's art, taking it at its best, are indeed fraught with promise; and that, especially in landscape, enthusiasm and love for nature are now operating, and will create a school far superior to any of the past. We have, indeed, some displays at Rome and Naples that would scarcely pass muster in any provincial town of Great Britain; where pedantic conventionality, exaggeration, and falsity have been the prominent characteristics of both landscape and figure painting; where scenes from nature in no way reminded of nature, and historic groups only suggested the idea of the hired model or *tableau* on the stage. In the now open rooms of the Tuscan *Società Promotrice*, we observe the same tendencies, in part now, or at least newly prominent, the prevalence of which in Italian art of recent years we have formerly had occasion to report on, and which are, on the whole, encouraging, laudable, though they have not yet brought forth the higher results to be hoped for. We perceive the increasingly earnest study of wild nature, both in her lovelier and sterner aspects; the judicious preference for subjects from that most fertile field, Italy's own Mediæval history, or from the pages of native poets, to the setting aside of those worn-out themes from Greek and Roman antiquity; marked predilection also for scenes become historic on the page of this country's recent annals, as the battles of the campaign in '59; also a taste for the pleasant familiarities of humble every-day life in the cottage, or among the labourers in the field, by the canal, or in the workshop; and withal a noticeable neglect for the old favourites of the devotional school; scarcely a Madonna to be seen, and an absolute deficit of scenes from legends of saints, the few sacred subjects that are attempted being usually among the least meritorious and feebiest in treatment.

On the ground-floor of the same establishment another modern collection is now to be seen, consisting of pictures formerly in a grand-ducal palace, and afterwards in the upper rooms of the Dogana, where we found them about two years ago; most conspicuous among which are the "Entrance of Charles VIII. into Florence," by Bezzvoli, and the "Abdication of the Duke of Athens," by Ussi, a picture that made a sensation sufficing at once to bestow fame on its artist. The very effective (if not natural) grouping in that composition has lately been produced with all possible skill and success as a *tableau vivant* in ballet-spectacle at the Pugliano Theatre in Florence. Two pictures by Mussini, director of the Academy at Siena, were lately exhibited at the Florentine Accademia, in a room destined for this separate display; a full-length (cabinet size) of the king holding the sword, as just presented to him (in 1860), of Castruccio Castracani; and the "Beata Bonizella," a saint of the fourteenth century, unknown, we believe, out of Tuscany, as to whom legends tell us of a waxen chalice found in her dead hands when her tomb was opened, there preternaturally wrought by the marvellous labour of bees!—the royal portrait more remarkable for the able working-up of accessories in a palace-interior than for any other qualities; the figure of the saint in rich costume on a golden ground, exemplifying a pre-Raffaellite minuteness of elaborate finish, and a high-wrought expression in the extatic countenance that suggested the artist's familiarity with Beato Angelico; as to colouring, both pictures, indeed, sufficiently distinguished to vindicate a high place for Mussini.

The Florentine Philo-dramatic Society promises a series of performances, in the object of defraying costs for a monument to Goldoni, with a statue in marble from the plaster, by Cambi, which was exposed to temporary publicity on one of the bridges during the Dante Festival there last spring; and we are glad to learn that the same society also promises its exertions towards accomplishing a long-intended monument of Niccolini, for erection in S. Croce.

THE SOCIETY OF BRITISH ARTISTS.

THE exhibition in Suffolk-street for the current year consists of 761 paintings in oil, 326 water-colour pictures, and 10 pieces of sculpture, in all 1,097 works. The water-colour room makes an excellent show, superior to its usual aspect, and serves as a fresh indication of the spread of the practice of water-colour in art in England. Perhaps, too, outsiders feel they have a better chance here than in the inner rooms, where the members of the Society, all painters in oil, of course have paramount claims for space. The staple of the Exhibition is very much what it has been for several years past. There is little of great power, but many agreeable pictures. 18, "An Old Normandy Fishing Town," J. J. Wilson, is the best picture the artist has exhibited for some time. The water good, as usual, and the landscape better. 42, "The Windmill. Evening," G. Cole, is a rich effect of sun-set:—

"Hung o'er a cloud above the steep that rears
Its edge all flame, the broad'ning sun appears."

54, "The Ship-boy's Letter," T. Roberts; 105, "Life in Death," P. Levin; and 112, "Is it a Purse or a Coffin?" Frank Holl, jun., are all successful to the extent aimed at. In the last a poor famished child has found her way to the fireplace of a well-furnished room, and is pondering the question that gives title to the picture. How she got there is not clear, unless we are to suppose it, from some canvasses indicated, the studio of the painter. 205, "Resting at the Plough, on the Downs near Beachy Head," is a very good specimen of Tennant's art: he exhibits, of course, many others. 213, "Passion and Principle," E. C. Barnes, has a story, and tells it not ill. 235, "Straw Rope-making in the Highlands," Mrs. Margaret Robbinson, shows force and power that excuse some minor shortcomings. 221, "Neapolitan Peasants," J. Noble, 285, "The Shy Lover's Prompter," H. B. Roberts, and Lidderdale's "Spanish Lady" 352, have all marks against them in our catalogue. Messrs. Cobbett, Pyne, Woolmer, Clint, and Baxter do exactly what our readers know they can do; and J. J. Hill gives in 83, though not a "Gleaner," an elegantly-painted head.

RAILWAYS AND THEIR MAKERS.

THE position and practices of some of the railway contractors, in relation with their "directors," are beginning to force themselves on public attention, and not before this was necessary. The actual state of things has long been well known to those in any degree behind the scenes, although not dreamt of by the general public. What a history it would make if the whole story could be brought to light. Would all the engineers come out of the inquiry scathless? Perhaps not. The system has now been brought to such perfection, that the contractor is "master of the situation;" and even in cases where some of the directors fancy, good easy men, that they are controlling and making bargains and so forth, the contractors are having it all their own way by the voices of their nominees on the board. "Nominees on the board!" says Rusticus; "why, what do you mean?" Exactly what we say, good innocent. There are several very clever men who sit as directors, simply and entirely as representatives, under the rose, of certain great contractors; have received their "qualification" from them, and act only in their interest. Oh! it is a wonderful system, and a wonderful story. Railways, on the whole, do not pay so *very* well as investments; but individuals have made nice large fortunes out of them.

NEAPOLITAN STEPS IN SCIENTIFIC MATTERS.

THE annual address delivered at Naples to the members of the Royal Institute for the Encouragement of Natural, Economical, and Technical Science, by the perpetual secretary, Comm. Francesco del Giudice, gives a retrospect of last year's endeavours to utilize the revelations of science and to obtain further secrets and wealth from the storehouses of nature. At the head of the year's progress he places the successful efforts of Sig. Gennaro Mascolo to manufacture refined steel at his works in Naples. Deeming steel one of the powers of nations, the Institute conferred a silver medal upon Sig. Mascolo as a token of appreciation of his patriotic experiments. An improved compass, by Prof. Leopoldo di Majo, made by the distinguished mechanician Saverio Gargiulo, is next mentioned with commendation as being especially qualified to note magnetical deviations on board iron-clad ships. Considerable importance is attached to the Professor's improvement. An apparatus,

by Sig. Luigi Caccese, consisting of a stove able to maintain an equable heat, superior to that of the ambient atmosphere and less than 100°, was submitted to the Institute. A siver medal was assigned to Sig. Giovanni Mollica for progress in ceramic art; and to Sig. Luigi Fosca, for moveables made of the calcareous bitumen of Ragusi; and Sig. Basilio Scariano, for a new instrument for the more exact cutting of clothes, medals in bronze were decreed. The Institute accorded praise to the musical instruments of Cav. Antonio Fummo, and more especially to his *pianomelodico*. In minor matters, a proposition to measure the heights of buildings from a determined station-point, by Sig. Rossi; a machine for raising water, by Sig. Giuseppe Liguori; and an economical furnace, by Sig. Salvatore de Luca, are mentioned as worthy of recognition.

In the course of the year the director of the Botanical Gardens, Professor Gasparrini, has made, at the instance of the Institute, experiments and observations upon the cultivation of cotton, in furtherance of a view entertained in Italy of the possible aggrandisement of the country by this introduction. Some seeds of the Minister of Agriculture and Commerce have been sown successfully; and some additional information on the subject has been given by Comm. de Vincenzi, the director of the Industrial Museum at Turin.

A proposal was taken into consideration by the Institute as to the expediency of planting trees in appropriate sites in Naples, and particularly as to the alleged injury to the eyes from the down of plane trees. Three associates reported that the supposed danger did not exist; whereupon the planting of the city with planes was recommended, for the sake of the beauty of their appearance, their shadow, their rapid increase, hardihood, and adaptability to any soil, as well as for the worth of their wood.

In reply to a communication from the Minister of Agriculture and Commerce, a committee was appointed to inquire into the nature and cause of a disease of the grape, and forward him specimens of it; and a memoir by an associate, Sig. Gasparrini, and specimens gathered by Associate Semola, were forthwith transmitted to him. The same minister having informed the Institute that a disease among cereals existed in some parts of Italy, which was showing itself most markedly in wheat, an inquiry was made, which ended in the conclusion that it was not of sufficient importance to merit his solicitude, nor that of the Institute.

A third communication from the same minister invited the Institute to compose certain forms of instruction for the guidance of Signori Cav. De Filippi, Senatore del Regno, and Prof. Giglioli, in a visit they are about to make to Japan and China, previous to the drawing up of treaties of commerce with those distant nations; and Associates Costa, president, Gussone, Gasparrini, Scacchi, Del Giudice, Costa Achille, and Novi, were appointed to determine which of the products or industries of those countries could be advantageously introduced into Italy.

In speaking of the services of the president in the fosterage of science and industry, the secretary remarked that this year he had presented to the Institute some specimens of calcareous bitumen, for the purpose of enabling its members to consider the possibility of manufacturing that substance into various articles of ornament or luxury. He also presented specimens of the wood of Tuga, famed for its fine polish, with a view of showing the desirability of its culture; besides some specimens of minerals from Monte Cairo.

The vice-president had obtained a new salt in the course of the year, besides having made various experiments with the oil from the seeds of cotton.

The Institute, having observed in the Industrial Exhibitions of London and Paris that the porcelain ware, imitating Parian marble, is one of the most important ceramic productions, rivalling those of Sèvres and Dresden; and that the names of Kühn, Copeland, Battan, Minton, and the workshops of Creil, Bordeaux, Serraguemines, and Choisy le Roi are held in deserved esteem, has endeavoured to ascertain whether it is not possible to establish this manufacture in Italy, especially as the traces of iron contained in the local *caolini* are likely to yield the particular tint which characterises Parian ware. An inquiry into the industries of Europe, with a view of turning to account the natural resources of Italy by the introduction of any that promise to use them, or in any other way to turn them to the advantage of the country, has occupied, and still occupies, the attention of the Institute; and the compilation of a theoretical and practical manual on social economy, to serve as a guide to the technical societies of the country, is likewise still under consideration.

To complete his rapid review of the proceedings of the year, the secretary then gave a list of all the memoirs laid before the Institute, with a running commentary upon their contents. It will be seen that the bounteousness of the soil and climate is much relied upon as a means of adding to the national wealth. Sig. Giuseppe Frojo furnished information concerning the filbert-tree (*Corylus Avellana*), showing its large consumption and export, and recommending its extended cultivation as a further source of profit. Four associates, Del Giudice, Giordano, Scacchi, and Novi, wrote upon the ceramic art of the Neapolitan territory, showing the cause of its decadence, the means of reviving it, giving the seats of its former manufacture, divining the materials which yielded the superb colours of ancient ware, and expressing hope that the clay of the potter should again make Italy a giant in the eyes of nations. Sig. G. Gasparrini sent notices of an Australian myrtle, the wood of which is of value, and capable of resisting the vicissitudes of the climate. The president contributed geological and paleontological notes upon Terminio, which will form part of a geological *carta* of the Neapolitan province. Signor Giuseppe Costa gave an account of an insect which damaged the cotton product, with suggestions to destroy it. The associates Giordano, Minichini, and Presutti made a communication respecting the mineral waters of the province, the temperature of which varies from 15° centigradi to that little short of boiling heat. Associates Presutti and Briganti ransacked the history of man from his savage state, to give a succinct account of the various modes of dressing skins. Asphalte and the purposes to which it can be applied furnished the subject of another communication. The grape disease and the cotton malady were also treated at length. Signor Leopoldi di Maio gave a written account of the compass, for which he obtained a prize; and, in December, the last contribution but one of the session was made by Signor Achille Costa, upon the silkworm of the oak of Giappone. The last communication related to the steam stove, with electro-magnetic regulator, of Sig. Caccese, before mentioned.

Science suffered two severe losses in Naples last year, in the deaths of the associates Giovanni Semmola and Francesco Briganti. The former was the author of thirty-nine works, chiefly bearing upon medicine and chemistry: of the latter, who was scarcely less industrious, the secretary remarks, towards the conclusion of a lengthy panegyric, that between the spectacle of war, epidemics, and social catastrophes, it was refreshing to perceive a man of science so devoted to the benefaction of humanity.

THE FIRST STONE BUILDING IN MADAGASCAR.

MEMORIAL CHURCH, AMBATONAKANGA ANTANANARIVO.

THIS church, in progress under the superintendence of Mr. James Sibree, jun., architect, is constructed of local stone, a kind of granite, a great part being quarried on the spot. The style adopted is an adaptation of Norman, simply treated so as to suit the rough character of the material, and the inexperience of the native workmen. The building consists of a nave and aisles, divided by massive circular stone columns and arches. The northern end is terminated by an apse, beyond which are ministers' vestry and class-rooms. The south, or chief end, facing the city, has a tower and spire at the east angle, rising to between 80 ft. and 90 ft. in height. A clock and bell, the gift of two English ladies, will be placed in the upper stage of the tower. Two large and deeply-recessed circular arched doorways give access to the interior. Over the centre doorway is a triplet of circular-headed windows, which will be filled with stained glass made by Messrs. Heaton, Butler, & Bayne, who also supply coloured glass for the circular apsidal lights. The side windows are to be filled in with tinted rolled glass in leaded quarries, and with louvring, in order to provide thorough ventilation in the hot season. The roof, which is hammer-beam in construction, will have the timbers partly exposed and boarded beneath the collar-beam. A platform will be formed in the apse, with communion enclosure in front. The church will be partly seated with open benches, and the rest of the space left free to suit the native custom of sitting on mats laid on the floor, which is preferred by the mass of the people to a raised seat. The internal dimensions, exclusive of vestibule and apse, are 74 ft. long by 46 ft.;—external dimensions, including vestries and tower, 106 ft. by 54 ft.;—height of side walls, 17 ft. 6 in.; to ridge, 43 ft. A gallery will be formed over the vestibule and the bay of the nave. The building is expected to accommodate with comfort 1,000 to 1,200 people. The church is to be roofed with tiles, made under the direction of Mr. James Cameron, who has also superintended the carpenters' and joiners' work. From the commencement great and unusual difficulties have been encountered in the undertaking. It is the first stone building of the kind yet erected in the Island of Madagascar; the workmen have, therefore, had to be taught the most simple matters of detail. But the greatest hinderance has arisen from the peculiar state of society existing in Madagascar, by which all skilled labour is liable to be taken for indefinite periods, not only by the sovereign, but by the higher officers of state. The church is built under the auspices of the directors of the London Missionary Society. This is the first of four intended to be erected in the capital.

ST. JAMES'S EPISCOPAL CHURCH, LEITH.

SOME three or four years ago the enthusiastic Gothicists in this neighbourhood were in a flutter of delight at the idea of Mr. Gilbert Scott having been employed as architect for St. James's Episcopal Church. "Now," said they, "you'll see what a really good Gothic church is." The church is completed, and the bright anticipations have resulted in disappointment. It cannot be expected that Mr. Scott can bestow equal attention upon each and all of the numerous works to which his name is attached; and a small church in the north, where funds were not superabundant, was not likely to meet with special consideration.

The church consists of nave, transepts, and apsidal chancel, with a spire at the south-east angle of the transept. The west end is an echo of that of Dunblane Cathedral, and this beautiful specimen of Early Gothic was imposed upon the architect as the model upon which the new church was to be designed. The reproduction is far from being successful, having neither the richness of detail nor gracefulness of proportion of the original; the buttresses, in particular, are clumsy, and more heavy than the necessities of the case call for. The spire is the most graceful feature of the composition, but appears to be defective in construction, as wide cracks are observable in the transept gable, against which it abuts. In the interior the proportions are good, but the detail is very unequal, the mouldings in some parts being very strongly pronounced, and in the chancel the carving is so minute as to be invisible at a short distance. The open timber roof is the worst feature of the design, being more like the work of an engineer than that of an architect, the heavy diagonally-braced principals having much the look of iron girders painted in imitation of wood. How far the architect is liable for all this we are not aware; but the church is unlike any other of his works that we have seen. The greatest artists may fail sometimes, and we must set down this as one of Mr. Scott's failures.

PNEUMATO-ELECTRIC ORGAN.

AT Salon, a charming little town in Provence, there exists a pneumato-electric organ, which leaves nothing to be desired either for power, delicacy of touch, or efficacy of mechanism. It must be remarked that the electric fluid, in its employment here, has no influence either on the intensity, note, or pitch of the sound of the instrument. It only replaces a system of complicated levers by one of insulated wires instantaneous in their action. The current proceeding from the electric battery is conducted by metallic wires under the keys, by the action of which it is placed in communication with the valves of the organ. Thus there are two distinct parts in the circulation of the current: the first is be-

tween the pile and the underside of the key-board; the second leads thence to the valves.

The pile consists of a number of glass recipients, containing protosulphate of mercury dissolved in water. In each of these is a piece of zinc between two mineral carbon plates. This battery, of economic construction, will last for five or six months without a fresh supply of mercury being added. The sulphuric acid attacks the zinc, while the mercury is deposited at the bottom of the vessels, and is thus preserved. It can be readily dissolved in sulphuric acid again, so that the only outlay in the working of this pile is a little sulphuric acid once every five or six months, and a piece of zinc at the same time. The deflection of the needle caused by this current is from 40 to 50 degrees.

An electro-magnet is connected with the wind-valves by means of a small lever connected with the bellows, or vessel of compressed air. On the keys being pressed down, the communication is established between the pile and the soft iron magnet, which, becoming electrified, attracts the lever and opens the valve admitting air to the pipes.

INSTITUTION OF CIVIL ENGINEERS.

ON March 20th, the paper read was "On the Maintenance and Renewal of Permanent Way," by Mr. R. Price Williams. The author thought it must be confessed that the condition of the permanent way, so far as regarded its durability, had in no way kept pace with the demands upon it, and that in this respect it compared unfavourably with other branches of railway engineering. Thus, for instance, whilst the weight and power of locomotive engines had been more than quadrupled in thirty years, the increased efficiency resulting from more perfect workmanship and a better description of material was such, that, on the Great Northern Railway, the per-centage on the gross traffic receipts for locomotive expenses had even slightly decreased during the last fourteen years; whereas, on the other hand, that of maintenance of way had increased more than 200 per cent. in a similar period.

On the London and North-Western Railway the cost of maintenance of way had reached 270*l.* per mile per annum; that of staff and other charges had been regular and uniform throughout down to the present time; the item works of line showed considerable variation, due probably to the heavy expenditure at times in replacing timber viaducts and repairing slips; and stations and station works also exhibited the same variable character. It was, however, in the last item, renewals of way, that the principal disturbance of outline was noticeable. This was alluded to in periods in the paper, and the gross result arrived at was, that in the nineteen years 1,906,858*l.* had been expended on renewals of way alone, representing something like 1,362 miles of single line, or almost one-half of the whole mileage maintained in the year 1865. This gave an annual average, since 1847, of 103,000*l.*, which was equivalent to nearly 73 miles of single way of the main line broken up and entirely replaced annually during the period referred to; chiefly in situations where the traffic was heaviest, and where consequently, owing to the short intervals between the trains, the facilities for doing the work were the least, and the danger of accident the greatest.

The average cost of renewals per mile per annum during a period of years, on the nine railways to which the statistics related, was shown in the following table:—

No.	Name of Railway.	Average of Years.	Cost per Mile per Annum.
1	London and North-Western	18¼	£145
2	North-Eastern	14	83
3	Midland	17½	84
4	London and South-Western	11	72
5	Great Northern	9½	110
6	Lancashire and Yorkshire	16¼	156
7	South-Eastern	15¼	102
8	London, Brighton, and South Coast	12½	94
9	Manchester, Sheffield, and Lincolnshire	9	49

The introduction of steel rails, manufactured chiefly by what was known as the Bessemer process, and the satisfactory nature of the results obtained, encouraged the belief that in this material had at length been obtained, what was alone wanting to give something like real permanency to that which in name alone had hitherto deserved the title of permanent way. Two steel rails laid in May, 1862, at the Chalk Farm Bridge, on the London and North-Western Railway, side by side with two ordinary iron rails, after outlasting sixteen faces of the iron rails, were taken up in August last, and the one face only which had been exposed, during more than three years, to the traffic of 9,550,000 engines, trucks, &c., and 95,577,240 tons, although evenly worn to the extent of a little more than a ¼ of an inch, still appeared to be capable of enduring much more work.

The general adoption of steel rails on main lines, where the traffic was of the heavy description referred to, would, in the opinion of the author, not only prove cheaper in the end, but, what was of infinitely greater importance, would, through the less frequent breaking up of the road, materially add to the safety of the travelling public. A tabular statement, which had been prepared by Mr. R. Johnson, of the cost of using guaranteed iron rails at 7*l.* 18*s.* per ton, and estimated to last three years, and of steel rails at 15*l.* per ton, supposed to last twenty years, showed a balance of 50 per cent. in favour of steel rails.

THE OPERATIVES' HOUSE BUILDING COMPANY (LIMITED).

THIS company has been incorporated under the Companies Act, 1862; capital 100,000*l.* in 10,000 shares of 10*l.* each. The trustees are the Marquis Townshend, and Messrs. Thomas Hughes, M.P., William J. Maxwell, Arthur Otway, M.P., and Thomas Twining, V.P.S.A. The architect is Mr. Samuel Sharp, of Nottinghill, and the secretary Mr. W. H. Robinson. Offices: 10, John-street, Adelphi. This company, says the prospectus, is formed to meet the urgent need for additional dwellings, of an improved character, for the working classes of London. For the present its operations will be chiefly carried out in the more densely populated districts, where the need for improvement is most pressing, but subsequently they may be extended to the suburbs. It will be conducted upon commercial principles. It is estimated that the plans prepared by the architect to the Operatives' House Building Company will, through their greater simplicity in arrangement and design, prove much more economical in cost of building than any of the structures above referred to, and justify the anticipation of a much greater per-centage of profit. [It is to be hoped the greatest attention will be given to the problem how to obtain in such dwellings thorough ventilation without draughts.] Previous to the formation of the company, several large public meetings were held, at one of which a committee of working men was appointed, who discussed the details of the plan, and it received their cordial approval. Their opinions are embodied in their report, which is published at the office of the *Social Science Review*, and may be had at the office of the company, and at the Economic Museum of Mr. Thomas Twining, Twickenham, to whose valuable advice and interest in the undertaking the company is greatly indebted.

ACCIDENTS.

ONE man has been killed and two dangerously injured at the stone-works in the occupation of Mr. William Freeman, stone-merchant, of the City-road Basin. The men were working a crane on a tramway lifting stone from a barge, and whilst so engaged one of the beams broke, and the crane and the men were precipitated on to the stones in the barge beneath.——A dreadful accident occurred at Preston recently. The cotton-mill belonging to Mr. Henry Seed, in Ribbleton-lane, is divided into two portions, and one of these was used for scutching purposes and for the preparation of cotton, and the boilers for the whole of the establishment were upon the ground-floor. A large cistern, measuring about 12 yards in length, 6 yards in breadth, and 2 yards in depth, was upon the top of the roof, and it was full of water. It has been computed that there were several hundred tons weight of water in this cistern, and about an hour before closing time this cistern gave way, and dragged with it the whole of the four stories of that portion of the mill, burying two men, named Hoole and Leyland, in the *débris*. Fortunately Leyland was near the door at the time of the accident, and as a kind of arch was formed over him by broken beams, he was to some extent protected. Hoole was killed. The loss to the mill-owners will be several thousands of pounds.——The railway-station at Kirriemuir, in Scotland, has been destroyed by fire. It was of wood. A large quantity of goods was destroyed. The damage in all will be some 3,000*l.* The cause of the fire is unknown.——During a thunderstorm which a few days since burst over Varerines-sur-Morge, Puy-de-Dome, France, the lightning fell on a cottage, which caught fire, and the flames spread with such rapidity that more than twenty other buildings were destroyed. The loss falls altogether on the poorer classes.——A portion of the great bur-wall by which part of the street was supported, has fallen in Corporation-street, Halifax. The street was formed a few years ago, partly at the expense of the corporation, and partly at that of the owners of the property in the neighbourhood, to provide a better communication with the centre and the north parts of the town. In forming the road a deep ravine had to be crossed, and this was accomplished by erecting a heavy stone wall on one side, about 50 ft. high, and making it level by shooting earth behind. Latterly, Messrs. Crossley & Company, Limited, have been preparing the foundations for a large warehouse near the wall, the base of which, it is believed, was thereby weakened. From the appearance of the wall, the *Leeds Mercury* says, it seems to have been very imperfectly built.

NEW WATER METER.

MESSRS. ROBERTON-BRISSON & COIGNARD have invented a new meter for measuring supplies of water in such a manner that the smallest quantities, as well as the full supplies, are accurately registered, whatever be the velocity or pressure of the quantity delivered; it measures the quantity without causing any sensible intermission in the current or diminishing the pressure in an appreciable degree beyond what may be the result of the friction of the parts of the apparatus. The meter consists of a pair of coupled cylinders, in which pistons move giving motion to two slide-valves, which open and shut alternately the entrance and exit of the water. The two cylinders are of cast-iron, as are the rest of the pieces except the slide-valves and the rods, which are of copper and brass. The water enters into the valve-box, passes into one of the cylinders, and acts on the piston. When this has arrived near the end of its stroke, the ports are partly open so as to admit water to the second piston, so that it may commence its course when the first has finished its course; consequently, there is no interruption in the flow, nor any intermittence in the registering of the quantity passing through the meter. The reciprocating motion of the slide-valves, which are fixed immediately upon the end of the piston-rod, sets in motion a small lever in connexion with the register and dial-plates which are similar to those in use for gas-meters. Constructed in the workshops of Coignard & C^ie^., this new machine has received practical sanction on a large scale. The towns of Nantes and Angers, the Imperial school of arts and manufactures, the administration of the Versailles Water-works, those of Marly and St. Cloud, and the water service of the Imperial Palace of Meudon, have employed it to their satisfaction.

THE TRADES MOVEMENT.

London.—A delegate meeting of the joiners of the metropolis has been held to consider the propriety of enforcing the memorial for an advance of another halfpenny per hour on the present rate of wages, making the payment for skilled workmen 8d. per hour. About 200 delegates were present, representing the workmen of nearly every large firm in the building trade, and every large job now going on in the metropolis, comprising both society and non-society men: altogether about 5,000 men are said to have been represented. The delegate from Jackson & Shaw's firm was called to the chair. The chairman said every delegate present was aware that last year they had asked for an advance of ½d. per hour on their then rate of wages, 7d. per hour, and that the employers, after a strike had taken place at Messrs. Cubitt's, had offered an advance of ½d. per hour, which was

by Sig. Luigi Caccese, consisting of a stove able to maintain an equable heat, superior to that of the ambient atmosphere and less than 100°, was submitted to the Institute. A siver medal was assigned to Sig. Giovanni Mollica for progress in ceramic art; and to Sig. Luigi Fosca, for moveables made of the calcareous bitumen of Ragusi; and Sig. Basilio Scariano, for a new instrument for the more exact cutting of clothes, medals in bronze were decreed. The Institute accorded praise to the musical instruments of Cav. Antonio Fummo, and more especially to his *piano-melodico*. In minor matters, a proposition to measure the heights of buildings from a determined station-point, by Sig. Rossi; a machine for raising water, by Sig. Giuseppe Liguori; and an economical furnace, by Sig. Salvatore de Luca, are mentioned as worthy of recognition.

In the course of the year the director of the Botanical Gardens, Professor Gasparrini, has made, at the instance of the Institute, experiments and observations upon the cultivation of cotton, in furtherance of a view entertained in Italy of the possible aggrandisement of the country by this introduction. Some seeds of the Minister of Agriculture and Commerce have been sown successfully; and some additional information on the subject has been given by Comm. de Vincenzi, the director of the Industrial Museum at Turin.

A proposal was taken into consideration by the Institute as to the expediency of planting trees in appropriate sites in Naples, and particularly as to the alleged injury to the eyes from the down of plane trees. Three associates reported that the supposed danger did not exist; whereupon the planting of the city with planes was recommended, for the sake of the beauty of their appearance, their shadow, their rapid increase, hardihood, and adaptability to any soil, as well as for the worth of their wood.

In reply to a communication from the Minister of Agriculture and Commerce, a committee was appointed to inquire into the nature and cause of a disease of the grape, and forward him specimens of it; and a memoir by an associate, Sig. Gasparrini, and specimens gathered by Associate Semola, were forthwith transmitted to him. The same minister having informed the Institute that a disease among cereals existed in some parts of Italy, which was showing itself most markedly in wheat, an inquiry was made, which ended in the conclusion that it was not of sufficient importance to merit his solicitude, nor that of the Institute.

A third communication from the same minister invited the Institute to compose certain forms of instruction for the guidance of Signori Cav. De Filippi, Senatore del Regno, and Prof. Giglioli, in a visit they are about to make to Japan and China, previous to the drawing up of treaties of commerce with those distant nations; and Associates Costa, president, Gussone, Gasparrini, Scacchi, Del Giudice, Costa Achille, and Novi, were appointed to determine which of the products or industries of those countries could be advantageously introduced into Italy.

In speaking of the services of the president in the fosterage of science and industry, the secretary remarked that this year he had presented to the Institute some specimens of calcareous bitumen, for the purpose of enabling its members to consider the possibility of manufacturing that substance into various articles of ornament or luxury. He also presented specimens of the wood of Tuga, famed for its fine polish, with a view of showing the desirability of its culture; besides some specimens of minerals from Monte Cairo.

The vice-president had obtained a new salt in the course of the year, besides having made various experiments with the oil from the seeds of cotton.

The Institute, having observed in the Industrial Exhibitions of London and Paris that the porcelain ware, imitating Parian marble, is one of the most important ceramic productions, rivalling those of Sèvres and Dresden; and that the names of Kühn, Copeland, Battan, Minton, and the workshops of Creil, Bordeaux, Serraguemines, and Choisy le Roi are held in deserved esteem, has endeavoured to ascertain whether it is not possible to establish this manufacture in Italy, especially as the traces of iron contained in the local *caolini* are likely to yield the particular tint which characterises Parian ware. An inquiry into the industries of Europe, with a view of turning to account the natural resources of Italy by the introduction of any that promise to use them, or in any other way to turn them to the advantage of the country, has occupied, and still occupies, the attention of the Institute; and the compilation of a theoretical and practical manual on social economy, to serve as a guide to the technical societies of the country, is likewise still under consideration.

To complete his rapid review of the proceedings of the year, the secretary then gave a list of all the memoirs laid before the Institute, with a running commentary upon their contents. It will be seen that the bounteousness of the soil and climate is much relied upon as a means of adding to the national wealth. Sig. Giuseppe Frojo furnished information concerning the filbert-tree (*Corylus Avellana*), showing its large consumption and export, and recommending its extended cultivation as a further source of profit. Four associates, Del Giudice, Giordano, Scacchi, and Novi, wrote upon the ceramic art of the Neapolitan territory, showing the cause of its decadence, the means of reviving it, giving the seats of its former manufacture, divining the materials which yielded the superb colours of ancient ware, and expressing hope that the clay of the potter should again make Italy a giant in the eyes of nations. Sig. G. Gasparrini sent notices of an Australian myrtle, the wood of which is of value, and capable of resisting the vicissitudes of the clir tributed geological a upon Terminio, which gical *carta* of the Nea Giuseppe Costa gave which damaged the co tions to destroy it. Minichini, and Presutt respecting the minera the temperature of wh gradi to that little sho ciates Presutti and history of man from hi succinct account of the ing skins. Asphalte a it can be applied furnis communication. The cotton malady were Signor Leopoldi di Maio of the compass, for whi and, in December, the l of the session was made upon the silkworm of the last communication rela with electro-magnetic re before mentioned.

Science suffered two last year, in the deaths of Semmola and Francesco was the author of thir bearing upon medicine a latter, who was scarcely secretary remarks, toward lengthy panegyric, that b war, epidemics, and soci refreshing to perceive devoted to the benefaction

BAD PRINT IN C

THE FIRST STONE BUILDING IN MADAGASCAR.

MEMORIAL CHURCH, AMBATONAKANGA ANTANANARIVO.

THIS church, in progress under the superintendence of Mr. James Sibree, jun., architect, is constructed of local stone, a kind of granite, a great part being quarried on the spot. The style adopted is an adaptation of Norman, simply treated so as to suit the rough character of the material, and the inexperience of the native workmen. The building consists of a nave and aisles, divided by massive circular stone columns and arches. The northern end is terminated by an apse, beyond which are ministers' vestry and class-rooms. The south, or chief end, facing the city, has a tower and spire at the east angle, rising to between 80 ft. and 90 ft. in height. A clock and bell, the gift of two English ladies, will be placed in the upper stage of the tower. Two large and deeply-recessed circular arched doorways give access to the interior. Over the centre doorway is a triplet of circular-headed windows, which will be filled with stained glass made by Messrs. Heaton, Butler, & Bayne, who also supply coloured glass for the circular apsidal lights. The side windows are to be filled in with tinted rolled glass in leaded quarries, and with louvring, in order to provide thorough ventilation in the hot season. The roof, which is hammer-beam in construction, will have the timbers partly exposed and boarded beneath the collar-beam. A platform will be formed in the apse, with communion enclosure in front. The church will be partly seated with open benches, and the rest of the space left free to suit the native custom of sitting on mats laid on the floor, which is preferred by the mass of the people to a raised seat. The internal dimensions, exclusive of vestibule and apse, are 74 ft. long by 46 ft.;—external dimensions, including vestries and tower, 106 ft. by 54 ft.;—height of side walls, 17 ft. 6 in.; to ridge, 43 ft. A gallery will be formed over the vestibule and the bay of the nave. The building is expected to accommodate with comfort 1,000 to 1,200 people. The church is to be roofed with tiles, made under the direction of Mr. James Cameron, who has also superintended the carpenters' and joiners' work. From the commencement great and unusual difficulties have been encountered in the undertaking. It is the first stone building of the kind yet erected in the Island of Madagascar; the workmen have, therefore, had to be taught the most simple matters of detail. But the greatest hinderance has arisen from the peculiar state of society existing in Madagascar, by which all skilled labour is liable to be taken for indefinite periods, not only by the sovereign, but by [illegible] are observable in the transept gable, against which it abuts. In the interior the proportions are good, but the detail is very unequal, the mouldings in some parts being very strongly pronounced, and in the chancel the carving is so minute as to be invisible at a short distance. The open timber roof is the worst feature of the design, being more like the work of an engineer than that of an architect, the heavy diagonally-braced principals having much the look of iron girders painted in imitation of wood. How far the architect is liable for all this we are not aware; but the church is unlike any other of his works that we have seen. The greatest artists may fail sometimes, and we must set down this as one of Mr. Scott's failures.

PNEUMATO-ELECTRIC ORGAN.

AT Salon, a charming little town in Provence, there exists a pneumato-electric organ, which leaves nothing to be desired either for power, delicacy of touch, or efficacy of mechanism. It must be remarked that the electric fluid, in its employment here, has no influence either on the intensity, note, or pitch of the sound of the instrument. It only replaces a system of complicated levers by one of insulated wires instantaneous in their action. The current proceeding from the electric battery is conducted by metallic wires under the keys, by the action of which it is placed in communication with the valves of the organ. Thus there are two distinct parts in the circulation of the current: the first is be-

tween the pile and the underside of the key-board; the second leads thence to the valves.

The pile consists of a number of glass recipients, containing protosulphate of mercury dissolved in water. In each of these is a piece of zinc between two mineral carbon plates. This battery, of economic construction, will last for five or six months without a fresh supply of mercury being added. The sulphuric acid attacks the zinc, while the mercury is deposited at the bottom of the vessels, and is thus preserved. It can be readily dissolved in sulphuric acid again, so that the only outlay in the working of this pile is a little sulphuric acid once every five or six months, and a piece of zinc at the same time. The deflection of the needle caused by this current is from 40 to 50 degrees.

An electro-magnet is connected with the wind-valves by means of a small lever connected with the bellows, or vessel of compressed air. On the keys being pressed down, the communication is established between the pile and the soft iron magnet, which, becoming electrified, attracts the lever and opens the valve admitting air to the pipes.

...was, that in the nine-...years 1,906,858*l.* had been expended on renewals of way alone, representing something like 1,362 miles of single line, or almost one-half of the whole mileage maintained in the year 1865. This gave an annual average, since 1847, of 103,000*l.*, which was equivalent to nearly 73 miles of single way of the main line broken up and entirely replaced annually during the period referred to; chiefly in situations where the traffic was heaviest, and where consequently, owing to the short intervals between the trains, the facilities for doing the work were the least, and the danger of accident the greatest.

The average cost of renewals per mile per annum during a period of years, on the nine railways to which the statistics related, was shown in the following table:—

No.	Name of Railway.	Average of Years.	Cost per Mile per Annum.
1	London and North-Western	18½	£145
2	North-Eastern	14	83
3	Midland	17½	84
4	London and South-Western	11	73
5	Great Northern	9½	110
6	Lancashire and Yorkshire	16½	156
7	South-Eastern	15½	102
8	London, Brighton, and South Coast	12½	94
9	Manchester, Sheffield, and Lincolnshire	9	49

The introduction of steel rails, manufactured chiefly by what was known as the Bessemer process, and the satisfactory nature of the results obtained, encouraged the belief that in this material had at length been obtained, what was alone wanting to give something like real permanency to that which in name alone had hitherto deserved the title of permanent way. Two steel rails laid in May, 1862, at the Chalk Farm Bridge, on the London and North-Western Railway, side by side with two ordinary iron rails, after outlasting sixteen faces of the iron rails, were taken up in August last, and the one face only which had been exposed, during more than three years, to the traffic of 9,550,000 engines, trucks, &c., and 95,577,240 tons, although evenly worn to the extent of a little more than a ¼ of an inch, still appeared to be capable of enduring much more work.

The general adoption of steel rails on main lines, where the traffic was of the heavy description referred to, would, in the opinion of the author, not only prove cheaper in the end, but, what was of infinitely greater importance, would, through the less frequent breaking up of the road, materially add to the safety of the travelling public. A tabular statement, which had been prepared by Mr. H. Johnson, of the cost of using guaranteed iron rails at 7*l.* 18*s.* per ton, and estimated to last three years, and of steel rails at 15*l.* per ton, supposed to last twenty years, showed a balance of 50 per cent. in favour of steel rails.

...E OPERATIVES' HOUSE BUILDING COMPANY (LIMITED).

...s company has been incorporated under ...ompanies Act, 1862; capital 100,000*l.* in ... shares of 10*l.* each. The trustees are ...arquis Townshend, and Messrs. Thomas ...s, M.P., William J. Maxwell, Arthur ..., M.P., and Thomas Twining, V.P.S.A. ...chitect is Mr. Samuel Sharp, of Notting-...d the secretary Mr. W. H. Robinson. ... 10, John-street, Adelphi. This com-...says the prospectus, is formed to meet ...gent need for additional dwellings, of an ...ed character, for the working classes of ... For the present its operations will be ...arried out in the more densely populated ..., where the need for improvement is ...ssing, but subsequently they may be ...d to the suburbs. It will be conducted ...mmercial principles. It is estimated ... plans prepared by the architect to ...ratives' House Building Company will, ... their greater simplicity in arrangement ...gn, prove much more economical in cost ...ng than any of the structures above re-..., and justify the anticipation of a much ...er-centage of profit. [It is to be hoped ...est attention will be given to the problem ...tain in such dwellings thorough ventila-...out draughts.] Previous to the forma-... company, several large public meetings ..., at one of which a committee of work-ing men was appointed, who discussed the details of the plan, and it received their cordial approval. Their opinions are embodied in their report, which is published at the office of the *Social Science Review*, and may be had at the office of the company, and at the Economic Museum of Mr. Thomas Twining, Twickenham, to whose valuable advice and interest in the undertaking the company is greatly indebted.

ACCIDENTS.

ONE man has been killed and two dangerously injured at the stone-works in the occupation of Mr. William Freeman, stone-merchant, of the City-road Basin. The men were working a crane on a tramway lifting stone from a barge, and whilst so engaged one of the beams broke, and the crane and the men were precipitated on to the stones in the barge beneath.——A dreadful accident occurred at Preston recently. The cotton-mill belonging to Mr. Henry Seed, in Ribbleton-lane, is divided into two portions, and one of these was used for scutching purposes and for the preparation of cotton, and the boilers for the whole of the establishment were upon the ground-floor. A large cistern, measuring about 12 yards in length, 6 yards in breadth, and 2 yards in depth, was upon the top of the roof, and it was full of water. It has been computed that there were several hundred tons weight of water in this cistern, and about an hour before closing time this cistern gave way, and dragged with it the whole of the four stories of that portion of the mill, burying two men, named Hoole and Leyland, in the *débris*. Fortunately Leyland was near the door at the time of the accident, and as a kind of arch was formed over him by broken beams, he was to some extent protected. Hoole was killed. The loss to the mill-owners will be several thousands of pounds.——The railway-station at Kirriemuir, in Scotland, has been destroyed by fire. It was of wood. A large quantity of goods was destroyed. The damage in all will be some 3,000*l.* The cause of the fire is unknown.——During a thunderstorm which a few days since burst over Varerines-sur-Morge, Puy-de-Dome, France, the lightning fell on a cottage, which caught fire, and the flames spread with such rapidity that more than twenty other buildings were destroyed. The loss falls altogether on the poorer classes.——A portion of the great bur-wall by which part of the street was supported, has fallen in Corporation-street, Halifax. The street was formed a few years ago, partly at the expense of the corporation, and partly at that of the owners of the property in the neighbourhood, to provide a better communication with the centre and the north parts of the town. In forming the road a deep ravine had to be crossed, and this was accomplished by erecting a heavy stone wall on one side, about 50 ft. high, and making it level by shooting earth behind. Latterly, Messrs. Crossley & Company, Limited, have been preparing the foundations for a large warehouse near the wall, the base of which, it is believed, was thereby weakened. From the appearance of the wall, the *Leeds Mercury* says, it seems to have been very imperfectly built.

NEW WATER METER.

MESSRS. ROBERTON-BRISSON & COIGNARD have invented a new meter for measuring supplies of water in such a manner that the smallest quantities, as well as the full supplies, are accurately registered, whatever be the velocity or pressure of the quantity delivered; it measures the quantity without causing any sensible intermission in the current or diminishing the pressure in an appreciable degree beyond what may be the result of the friction of the parts of the apparatus. The meter consists of a pair of coupled cylinders, in which pistons move giving motion to two slide-valves, which open and shut alternately the entrance and exit of the water. The two cylinders are of cast-iron, as are the rest of the pieces except the slide-valves and the rods, which are of copper and brass. The water enters into the valve-box, passes into one of the cylinders, and acts on the piston. When this has arrived near the end of its stroke, the ports are partly open so as to admit water to the second piston, so that it may commence its course when the first has finished its course; consequently, there is no interruption in the flow, nor any intermittence in the registering of the quantity passing through the meter. The reciprocating motion of the slide-valves, which are fixed immediately upon the end of the piston-rod, sets in motion a small lever in connexion with the register and dial-plates which are similar to those in use for gas-meters. Constructed in the workshops of Coignard & C^ie., this new machine has received practical sanction on a large scale. The towns of Nantes and Angers, the Imperial school of arts and manufactures, the administration of the Versailles Water-works, those of Marly and St. Cloud, and the water service of the Imperial Palace of Meudon, have employed it to their satisfaction.

THE TRADES MOVEMENT.

London.—A delegate meeting of the joiners of the metropolis has been held to consider the propriety of enforcing the memorial for an advance of another halfpenny per hour on the present rate of wages, making the payment for skilled workmen 8d. per hour. About 200 delegates were present, representing the workmen of nearly every large firm in the building trade, and every large job now going on in the metropolis, comprising both society and non-society men: altogether about 5,000 men are said to have been represented. The delegate from Jackson & Shaw's firm was called to the chair. The chairman said every delegate present was aware that last year they had asked for an advance of ½d. per hour on their then rate of wages, 7d. per hour, and that the employers, after a strike had taken place at Messrs. Cubitt's, had offered an advance of ½d. per hour, which was

by Sig. Luigi Caccese, consisting of a stove able to maintain an equable heat, superior to that of the ambient atmosphere and less than 100°, was submitted to the Institute. A siver medal was assigned to Sig. Giovanni Mollica for progress in ceramic art; and to Sig. Luigi Fosca, for moveables made of the calcareous bitumen of Ragusi; and Sig. Basilio Scariano, for a new instrument for the more exact cutting of clothes, medals in bronze were decreed. The Institute accorded praise to the musical instruments of Cav. Antonio Fummo, and more especially to his *piano-melodico*. In minor matters, a proposition to measure the heights of buildings from a determined station-point, by Sig. Rossi; a machine for raising water, by Sig. Giuseppe Lignori; and an economical furnace, by Sig. Salvatore de Luca, are mentioned as worthy of recognition.

In the course of the year the director of the Botanical Gardens, Professor Gasparrini, has made, at the instance of the Institute, experiments and observations upon the cultivation of cotton, in furtherance of a view entertained in Italy of the possible aggrandisement of the country by this introduction. Some seeds of the Minister of Agriculture and Commerce have been sown successfully; and some additional information on the subject has been given by Comm. de Vincenzi, the director of the Industrial Museum at Turin.

A proposal was taken into consideration by the Institute as to the expediency of planting trees in appropriate sites in Naples, and particularly as to the alleged injury to the eyes from the down of plane trees. Three associates reported that the supposed danger did not exist; whereupon the planting of the city with planes was recommended, for the sake of the beauty of their appearance, their shadow, their rapid increase, hardihood, and adaptability to any soil, as well as for the worth of their wood.

In reply to a communication from the Minister of Agriculture and Commerce, a committee was appointed to inquire into the nature and cause of a disease of the grape, and forward him specimens of it; and a memoir by an associate, Sig. Gasparrini, and specimens gathered by Associate Semola, were forthwith transmitted to him. The same minister having informed the Institute that a disease among cereals existed in some parts of Italy, which was showing itself most markedly in wheat, an inquiry was made, which ended in the conclusion that it was not of sufficient importance to merit his solicitude, nor that of the Institute.

A third communication from the same minister invited the Institute to compose certain forms of instruction for the guidance of Signori Cav. De Filippi, Senatore del Regno, and Prof. Giglioli, in a visit they are about to make to Japan and China, previous to the drawing up of treaties of commerce with those distant nations; and Associates Costa, president, Gussone, Gasparrini, Scacchi, Del Giudice, Costa Achille, and Novi, were appointed to determine which of the products or industries of those countries could be advantageously introduced into Italy.

In speaking of the services of the president in the fosterage of science and industry, the secretary remarked that this year he had presented to the Institute some specimens of calcareous bitumen, for the purpose of enabling its members to consider the possibility of manufacturing that substance into various articles of ornament or luxury. He also presented specimens of the wood of Tuga, famed for its fine polish, with a view of showing the desirability of its culture; besides some specimens of minerals from Monte Cairo.

The vice-president had obtained a new salt in the course of the year, besides having made various experiments with the oil from the seeds of cotton.

The Institute, having observed in the Industrial Exhibitions of London and Paris that the porcelain ware, imitating Parian marble, is one of the most important ceramic productions, rivalling those of Sèvres and Dresden; and that the names of Kühn, Copeland, Battan, Minton, and the workshops of Creil, Bordeaux, Serraguemines, and Choisy le Roi are held in deserved esteem, has endeavoured to ascertain whether it is not possible to establish this manufacture in Italy, especially as the traces of iron contained in the local *caolini* are likely to yield the particular tint which characterises Parian ware. An inquiry into the industries of Europe, with a view of turning to account the natural resources of Italy by the introduction of any that promise to use them, or in any other way to turn them to the advantage of the country, has occupied, and still occupies, the attention of the Institute; and the compilation of a theoretical and practical manual on social economy, to serve as a guide to the technical societies of the country, is likewise still under consideration.

To complete his rapid review of the proceedings of the year, the secretary then gave a list of all the memoirs laid before the Institute, with a running commentary upon their contents. It will be seen that the bounteousness of the soil and climate is much relied upon as a means of adding to the national wealth. Sig. Giuseppe Frojo furnished information concerning the filbert-tree (*Corylus Avellana*), showing its large consumption and export, and recommending its extended cultivation as a further source of profit. Four associates, Del Giudice, Giordano, Scacchi, and Novi, wrote upon the ceramic art of the Neapolitan territory, showing the cause of its decadence, the means of reviving it, giving the seats of its former manufacture, divining the materials which yielded the superb colours of ancient ware, and expressing hope that the clay of the potter should again make Italy a giant in the eyes of nations. Sig. G. Gasparrini sent notices of an Australian myrtle, the wood of which is of value, and capable of resisting the vicissitudes of the climate. The president contributed geological and paleontological notes upon Terminio, which will form part of a geological *carta* of the Neapolitan province. Signor Giuseppe Costa gave an account of an insect which damaged the cotton product, with suggestions to destroy it. The associates Giordano, Minichini, and Presutti made a communication respecting the mineral waters of the province, the temperature of which varies from 15° centigradi to that little short of boiling heat. Associates Presutti and Briganti ransacked the history of man from his savage state, to give a succinct account of the various modes of dressing skins. Asphalte and the purposes to which it can be applied furnished the subject of another communication. The grape disease and the cotton malady were also treated at length. Signor Leopoldi di Maio gave a written account of the compass, for which he obtained a prize; and, in December, the last contribution but one of the session was made by Signor Achille Costa, upon the silkworm of the oak of Giappone. The last communication related to the steam stove, with electro-magnetic regulator, of Sig. Caccese, before mentioned.

Science suffered two severe losses in Naples last year, in the deaths of the associates Giovanni Semmola and Francesco Briganti. The former was the author of thirty-nine works, chiefly bearing upon medicine and chemistry: of the latter, who was scarcely less industrious, the secretary remarks, towards the conclusion of a lengthy panegyric, that between the spectacle of war, epidemics, and social catastrophes, it was refreshing to perceive a man of science so devoted to the benefaction of humanity.

THE FIRST STONE BUILDING IN MADAGASCAR.

MEMORIAL CHURCH, AMBATONAKANGA ANTANANARIVO.

THIS church, in progress under the superintendence of Mr. James Sibree, jun., architect, is constructed of local stone, a kind of granite, a great part being quarried on the spot. The style adopted is an adaptation of Norman, simply treated so as to suit the rough character of the material, and the inexperience of the native workmen. The building consists of a nave and aisles, divided by massive circular stone columns and arches. The northern end is terminated by an apse, beyond which are ministers' vestry and class-rooms. The south, or chief end, facing the city, has a tower and spire at the east angle, rising to between 80 ft. and 90 ft. in height. A clock and bell, the gift of two English ladies, will be placed in the upper stage of the tower. Two large and deeply-recessed circular arched doorways give access to the interior. Over the centre doorway is a triplet of circular-headed windows, which will be filled with stained glass made by Messrs. Heaton, Butler, & Bayne, who also supply coloured glass for the circular apsidal lights. The side windows are to be filled in with tinted rolled glass in leaded quarries, and with louvring, in order to provide thorough ventilation in the hot season. The roof, which is hammer-beam in construction, will have the timbers partly exposed and boarded beneath the collar-beam. A platform will be formed in the apse, with communion enclosure in front. The church will be partly seated with open benches, and the rest of the space left free to suit the native custom of sitting on mats laid on the floor, which is preferred by the mass of the people to a raised seat. The internal dimensions, exclusive of vestibule and apse, are 74 ft. long by 46 ft.;—external dimensions, including vestries and tower, 106 ft. by 54 ft.;—height of side walls, 17 ft. 6 in.; to ridge, 43 ft. A gallery will be formed over the vestibule and the bay of the nave. The building is expected to accommodate with comfort 1,000 to 1,200 people. The church is to be roofed with tiles, made under the direction of Mr. James Cameron, who has also superintended the carpenters' and joiners' work. From the commencement great and unusual difficulties have been encountered in the undertaking. It is the first stone building of the kind yet erected in the Island of Madagascar; the workmen have, therefore, had to be taught the most simple matters of detail. But the greatest hinderance has arisen from the peculiar state of society existing in Madagascar, by which all skilled labour is liable to be taken for indefinite periods, not only by the sovereign, but by the higher officers of state. The church is built under the auspices of the directors of the London Missionary Society. This is the first of four intended to be erected in the capital.

ST. JAMES'S EPISCOPAL CHURCH, LEITH.

SOME three or four years ago the enthusiastic Gothicists in this neighbourhood were in a flutter of delight at the idea of Mr. Gilbert Scott having been employed as architect for St. James's Episcopal Church. "Now," said they, "you'll see what a really good Gothic church is." The church is completed, and the bright anticipations have resulted in disappointment. It cannot be expected that Mr. Scott can bestow equal attention upon each and all of the numerous works to which his name is attached; and a small church in the north, where funds were not superabundant, was not likely to meet with special consideration.

The church consists of nave, transepts, and apsidal chancel, with a spire at the south-east angle of the transept. The west end is an echo of that of Dunblane Cathedral, and this beautiful specimen of Early Gothic was imposed upon the architect as the model upon which the new church was to be designed. The reproduction is far from being successful, having neither the richness of detail nor gracefulness of proportion of the original; the buttresses, in particular, are clumsy, and more heavy than the necessities of the case call for. The spire is the most graceful feature of the composition, but appears to be defective in construction, as wide cracks are observable in the transept gable, against which it abuts. In the interior the proportions are good, but the detail is very unequal, the mouldings in some parts being very strongly pronounced, and in the chancel the carving is so minute as to be invisible at a short distance. The open timber roof is the worst feature of the design, being more like the work of an engineer than that of an architect, the heavy diagonally-braced principals having much the look of iron girders painted in imitation of wood. How far the architect is liable for all this we are not aware; but the church is unlike any other of his works that we have seen. The greatest artists may fail sometimes, and we must set down this as one of Mr. Scott's failures.

PNEUMATO-ELECTRIC ORGAN.

AT Salon, a charming little town in Provence, there exists a pneumato-electric organ, which leaves nothing to be desired either for power, delicacy of touch, or efficacy of mechanism. It must be remarked that the electric fluid, in its employment here, has no influence either on the intensity, note, or pitch of the sound of the instrument. It only replaces a system of complicated levers by one of insulated wires instantaneous in their action. The current proceeding from the electric battery is conducted by metallic wires under the keys, by the action of which it is placed in communication with the valves of the organ. Thus there are two distinct parts in the circulation of the current: the first is be-

tween the pile and the underside of the key-board; the second leads thence to the valves.

The pile consists of a number of glass recipients, containing protosulphate of mercury dissolved in water. In each of these is a piece of zinc between two mineral carbon plates. This battery, of economic construction, will last for five or six months without a fresh supply of mercury being added. The sulphuric acid attacks the zinc, while the mercury is deposited at the bottom of the vessels, and is thus preserved. It can be readily dissolved in sulphuric acid again, so that the only outlay in the working of this pile is a little sulphuric acid once every five or six months, and a piece of zinc at the same time. The deflection of the needle caused by this current is from 40 to 50 degrees.

An electro-magnet is connected with the wind-valves by means of a small lever connected with the bellows, or vessel of compressed air. On the keys being pressed down, the communication is established between the pile and the soft iron magnet, which, becoming electrified, attracts the lever and opens the valve admitting air to the pipes.

INSTITUTION OF CIVIL ENGINEERS.

On March 20th, the paper read was "On the Maintenance and Renewal of Permanent Way," by Mr. R. Price Williams. The author thought it must be confessed that the condition of the permanent way, so far as regarded its durability, had in no way kept pace with the demands upon it, and that in this respect it compared unfavourably with other branches of railway engineering. Thus, for instance, whilst the weight and power of locomotive engines had been more than quadrupled in thirty years, the increased efficiency resulting from more perfect workmanship and a better description of material was such, that, on the Great Northern Railway, the per-centage on the gross traffic receipts for locomotive expenses had even slightly decreased during the last fourteen years; whereas, on the other hand, that of maintenance of way had increased more than 200 per cent. in a similar period.

On the London and North-Western Railway the cost of maintenance of way had reached 270*l.* per mile per annum; that of staff and other charges had been regular and uniform throughout down to the present time; the item works of line showed considerable variation, due probably to the heavy expenditure at times in replacing timber viaducts and repairing slips; and stations and station works also exhibited the same variable character. It was, however, in the last item, renewals of way, that the principal disturbance of outline was noticeable. This was alluded to in periods in the paper, and the gross result arrived at was, that in the nineteen years 1,906,858*l.* had been expended on renewals of way alone, representing something like 1,362 miles of single line, or almost one-half of the whole mileage maintained in the year 1865. This gave an annual average, since 1847, of 103,000*l.*, which was equivalent to nearly 73 miles of single way of the main line broken up and entirely replaced annually during the period referred to; chiefly in situations where the traffic was heaviest, and where consequently, owing to the short intervals between the trains, the facilities for doing the work were the least, and the danger of accident the greatest.

The average cost of renewals per mile per annum during a period of years, on the nine railways to which the statistics related, was shown in the following table:—

No.	Name of Railway.	Average of Years.	Cost per Mile per Annum.
1	London and North-Western	18½	£145
2	North-Eastern	14	83
3	Midland	17½	84
4	London and South-Western	11	72
5	Great Northern	9½	110
6	Lancashire and Yorkshire	16½	156
7	South-Eastern	15½	102
8	London, Brighton, and South Coast	12½	94
9	Manchester, Sheffield, and Lincolnshire	9	49

The introduction of steel rails, manufactured chiefly by what was known as the Bessemer process, and the satisfactory nature of the results obtained, encouraged the belief that in this material had at length been obtained, what was alone wanting to give something like real permanency to that which in name alone had hitherto deserved the title of permanent way. Two steel rails laid in May, 1862, at the Chalk Farm Bridge, on the London and North-Western Railway, side by side with two ordinary iron rails, after outlasting sixteen faces of the iron rails, were taken up in August last, and the one face only which had been exposed, during more than three years, to the traffic of 9,550,000 engines, trucks, &c., and 95,577,240 tons, although evenly worn to the extent of a little more than a ¼ of an inch, still appeared to be capable of enduring much more work.

The general adoption of steel rails on main lines, where the traffic was of the heavy description referred to, would, in the opinion of the author, not only prove cheaper in the end, but, what was of infinitely greater importance, would, through the less frequent breaking up of the road, materially add to the safety of the travelling public. A tabular statement, which had been prepared by Mr. R. Johnson, of the cost of using guaranteed iron rails at 7*l.* 18*s.* per ton, and estimated to last three years, and of steel rails at 15*l.* per ton, supposed to last twenty years, showed a balance of 50 per cent. in favour of steel rails.

THE OPERATIVES' HOUSE BUILDING COMPANY (LIMITED).

This company has been incorporated under the Companies Act, 1862; capital 100,000*l.* in 10,000 shares of 10*l.* each. The trustees are the Marquis Townshend, and Messrs. Thomas Hughes, M.P., William J. Maxwell, Arthur Otway, M.P., and Thomas Twining, V.P.S.A. The architect is Mr. Samuel Sharp, of Nottinghill, and the secretary Mr. W. H. Robinson. Offices: 10, John-street, Adelphi. This company, says the prospectus, is formed to meet the urgent need for additional dwellings, of an improved character, for the working classes of London. For the present its operations will be chiefly carried out in the more densely populated districts, where the need for improvement is most pressing, but subsequently they may be extended to the suburbs. It will be conducted upon commercial principles. It is estimated that the plans prepared by the architect to the Operatives' House Building Company will, through their greater simplicity in arrangement and design, prove much more economical in cost of building than any of the structures above referred to, and justify the anticipation of a much greater per-centage of profit. [It is to be hoped the greatest attention will be given to the problem how to obtain in such dwellings thorough ventilation without draughts.] Previous to the formation of the company, several large public meetings were held, at one of which a committee of working men was appointed, who discussed the details of the plan, and it received their cordial approval. Their opinions are embodied in their report, which is published at the office of the *Social Science Review*, and may be had at the office of the company, and at the Economic Museum of Mr. Thomas Twining, Twickenham, to whose valuable advice and interest in the undertaking the company is greatly indebted.

ACCIDENTS.

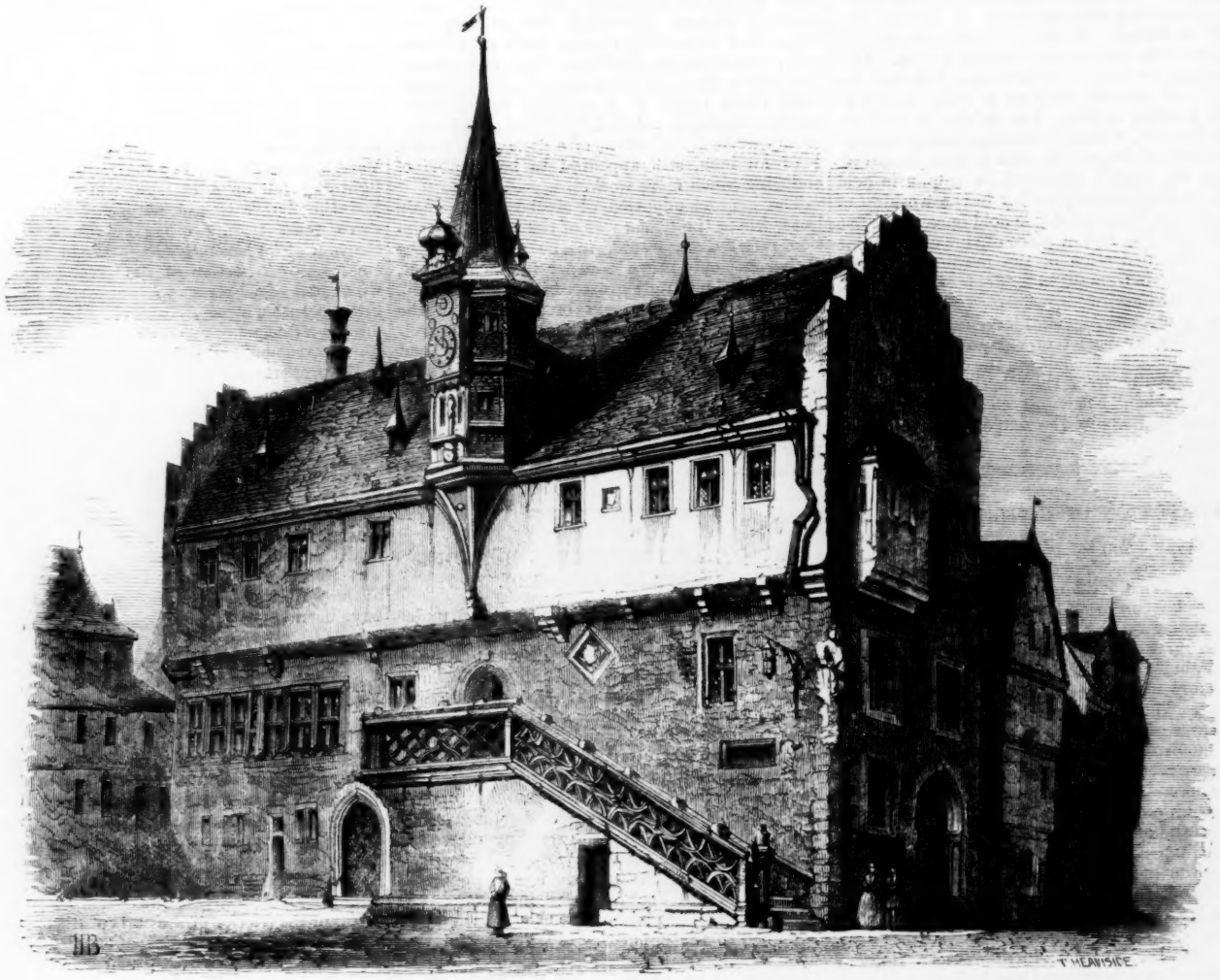
One man has been killed and two dangerously injured at the stone-works in the occupation of Mr. William Freeman, stone-merchant, of the City-road Basin. The men were working a crane on a tramway lifting stone from a barge, and whilst so engaged one of the beams broke, and the crane and the men were precipitated on to the stones in the barge beneath.——A dreadful accident occurred at Preston recently. The cotton-mill belonging to Mr. Henry Seed, in Ribbleton-lane, is divided into two portions, and one of these was used for scutching purposes and for the preparation of cotton, and the boilers for the whole of the establishment were upon the ground-floor. A large cistern, measuring about 12 yards in length, 6 yards in breadth, and 2 yards in depth, was upon the top of the roof, and it was full of water. It has been computed that there were several hundred tons weight of water in this cistern, and about an hour before closing time this cistern gave way, and dragged with it the whole of the four stories of that portion of the mill, burying two men, named Hoole and Leyland, in the *débris*. Fortunately Leyland was near the door at the time of the accident, and as a kind of arch was formed over him by broken beams, he was to some extent protected. Hoole was killed. The loss to the mill-owners will be several thousands of pounds.——The railway-station at Kirriemuir, in Scotland, has been destroyed by fire. It was of wood. A large quantity of goods was destroyed. The damage in all will be some 3,000*l.* The cause of the fire is unknown.——During a thunderstorm which a few days since burst over Varerines-sur-Morge, Puy-de-Dome, France, the lightning fell on a cottage, which caught fire, and the flames spread with such rapidity that more than twenty other buildings were destroyed. The loss falls altogether on the poorer classes.——A portion of the great bur-wall by which part of the street was supported, has fallen in Corporation-street, Halifax. The street was formed a few years ago, partly at the expense of the corporation, and partly at that of the owners of the property in the neighbourhood, to provide a better communication with the centre and the north parts of the town. In forming the road a deep ravine had to be crossed, and this was accomplished by erecting a heavy stone wall on one side, about 30 ft. high, and making it level by shooting earth behind. Latterly, Messrs. Crossley & Company, Limited, have been preparing the foundations for a large warehouse near the wall, the base of which, it is believed, was thereby weakened. From the appearance of the wall, the *Leeds Mercury* says, it seems to have been very imperfectly built.

NEW WATER METER.

Messrs. Robertson-Brisson & Coignard have invented a new meter for measuring supplies of water in such a manner that the smallest quantities, as well as the full supplies, are accurately registered, whatever be the velocity or pressure of the quantity delivered; it measures the quantity without causing any sensible intermission in the current or diminishing the pressure in an appreciable degree beyond what may be the result of the friction of the parts of the apparatus. The meter consists of a pair of coupled cylinders, in which pistons move giving motion to two slide-valves, which open and shut alternately the entrance and exit of the water. The two cylinders are of cast-iron, as are the rest of the pieces except the slide-valves and the rods, which are of copper and brass. The water enters into the valve-box, passes into one of the cylinders, and acts on the piston. When this has arrived near the end of its stroke, the ports are partly open so as to admit water to the second piston, so that it may commence its course when the first has finished its course; consequently, there is no interruption in the flow, nor any intermittence in the registering of the quantity passing through the meter. The reciprocating motion of the slide-valves, which are fixed immediately upon the end of the piston-rod, sets in motion a small lever in connexion with the register and dial-plates which are similar to those in use for gas-meters. Constructed in the workshops of Coignard & C^ie., this new machine has received practical sanction on a large scale. The towns of Nantes and Angers, the Imperial school of arts and manufactures, the administration of the Versailles Water-works, those of Marly and St. Cloud, and the water service of the Imperial Palace of Meudon, have employed it to their satisfaction.

THE TRADES MOVEMENT.

London.—A delegate meeting of the joiners of the metropolis has been held to consider the propriety of enforcing the memorial for an advance of another halfpenny per hour on the present rate of wages, making the payment for skilled workmen 8d. per hour. About 200 delegates were present, representing the workmen of nearly every large firm in the building trade, and every large job now going on in the metropolis, comprising both society and non-society men: altogether about 5,000 men are said to have been represented. The delegate from Jackson & Shaw's firm was called to the chair. The chairman said every delegate present was aware that last year they had asked for an advance of ½d. per hour on their then rate of wages, 7d. per hour, and that the employers, after a strike had taken place at Messrs. Cubitt's, had offered an advance of ½d. per hour, which was



TOWN HALL, OCHSENFURTH, FRANCONIA.——*Fifteenth Century.*

accepted by the men, with the understanding that as the ¾d. were refused, a memorial should be sent in to the employers giving six months' notice for another advance of a ¼d. per hour on the first Saturday in May next. These memorials were accordingly sent in, and the present meeting had been called to ascertain the opinion of the trade whether the prayer of that memorial should be enforced or not in May next. From the reports of the delegates it appeared that at least nine-tenths of the men were for the ¼d. advance in May, while of the others nearly all were willing to abide by the decision of the meeting.

Aberdeen.—In August last the operative house carpenters and joiners of Aberdeen asked from their employers a rise of 2s. a week on the average wages, to commence on the 1st of March. The masters declined, but offered 1s. This was refused by a number of men, and accordingly some 200 of their number have struck work. It was then found that the masters had agreed among themselves not to employ any man who had left his former employer on account of this dispute about wages; and this being considered an approximation to the "ticket of leave" system, it has been keenly resented, and a considerable number who had not struck have also given up work till the obnoxious agreement shall be withdrawn. The ship joiners have had their demand conceded to them. The average wage in Aberdeen is about 20s. a week.

Birmingham.—On the question of arbitration pending between the master builders and their operatives, the masters' committee have had a meeting, with delegates of the workmen, at which the latter expressed a desire that the arbitrators should be appointed at private meetings. To this the committee demurred, and it was agreed to do so at a public meeting. The mayor has granted the use of the town-hall for the purpose. A separate deputation from the masons was told by the committee that their demands would only be granted or otherwise in arbitration.

Hereford.—The masons, carpenters, and bricklayers have memorialized the master builders for a rise of 6d. per day, and to cease work at four p.m. on Saturdays. The high rate of living and rents in Hereford are stated as reasons for the application.

The London Billiard-table Makers.—A committee of the workmen of Messrs. Burroughes & Watts, of Soho-square, having applied for an increase of wages, have had their request at once granted.

TOWN HALLS, FRANCONIA.

OCHSENFURTH.

WE add to the illustrations already given, a view of the Town Hall at Ochsenfurth, according to promise.* It stands on the east side of the market-place, and bears on various parts of the front these dates,—

1894 · 1898 · 1899

The clock-turret and staircase are interesting specimens of the period. As we have already mentioned with reference to this building, the apartment on the left-hand side of the principal entrance, known as the Council Chamber, is a fine old room, lighted by six large square-headed windows, elaborately moulded. The ceiling is flat, and supported upon carved oak beams and stone corbels. This room, like others in the building, contains the whole of its ancient furniture: the tables are very good in design. In one room is a stove of glazed green tiles, coeval with the building. The staircase is of oak, and several of the upper chambers are panelled with the same material. At one angle of the building is a statue of the Madonna, with the original lamp and bracket.

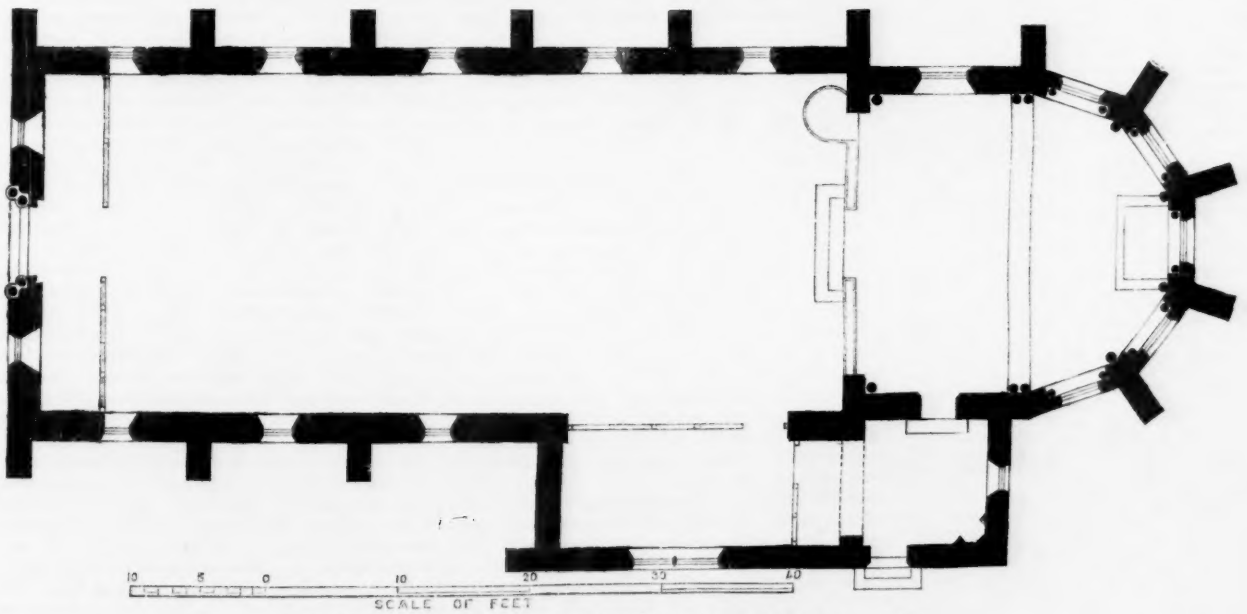
* See pp. 155, 157, *ante*.

NEW ENGLISH PROTESTANT CHURCH, STUTTGART, WURTEMBERG.

TAKING some little credit to ourselves for the impetus that has been given to the desire to provide fitting places of worship for English Protestant residents in foreign parts, we record always with pleasure fresh movements towards that end. Until within a few years past our co-religionists and countrymen abroad had been content in many instances to meet in places neither fitting nor decent. The error of this course seems now more generally recognised, and endeavours are rightly being made to remedy it. Some time ago we spoke of the erection of an English church in Stuttgart,—St. Catherine's. In our present issue we give a view and plan of it. The foundation-stone was laid early in the year 1864, and the church was opened for divine service on Advent Sunday, 1865. It is proposed to consecrate the building immediately.

The materials used in the construction are lime and sand stone, from the neighbourhood of Stuttgart; the dressings, both inside and out, are of a soft and rich yellow colour. The roof of

NEW ENGLISH PROTESTANT CHURCH, ST. CATHERINE'S, STUTTGART.—Messrs. Thos. Smith & Son, Architects.



ENGLISH PROTESTANT CHURCH, STUTTGART.—*Plan.*

the nave is open-timbered, stained and varnished, the chancel roof being groined. The windows are filled with elaborate stained glass, from Berlin, which, although well executed, is wanting in the spirit and force which characterise the works executed by English artists. The reredos and pulpit are of stone, with incised ornamentation. The screen which divides the church from the lady-chapel is of wrought iron. The various works have been executed from the designs of Messrs. Thomas Smith & Son, architects, London, at a cost of about 3,000*l*.

PARLIAMENTARY DEBATE ON COMPETITIONS.

THE PROPOSED LAW COURTS.

On Thursday evening in last week Mr. Bentinck moved—"That, in the opinion of this House, it is not expedient that the competition for the building of the new Courts of Justice should be limited to six architects only." In doing so, he said, for the last few years at least, whatever great works were executed in England or the Continent, the competitions for them were of an unlimited character. The competition for the Houses of Parliament was unlimited, so was the competition for the cartoons, for the Foreign-office, and for the Wellington monument. No man could say, however people might disagree with him as to the style of these buildings, that Sir C. Barry was not a man of great genius. The unlimited competition for the cartoons had brought out the latent talent of Mr. Herbert, Mr. Watts, and others; while in the case of the Foreign-office the result had been equally satisfactory. He would not quarrel with limited competition if the three following conditions were attached to it:—First, that the number of architects competing should be sufficient to afford to the tribunal which was to decide on their merits a full latitude of choice; secondly, that that tribunal should be thoroughly protected from any charge of favouritism; and, thirdly, that it should have such a knowledge of the subject it had to deal with that its decision should command the respect of the artistic world in general. The arrangement with regard to the proposed competition failed in every one of those particulars. First of all, there were to be only six competing architects. In the days of Sir Christopher Wren, or of the architects of the sixteenth century, it would have been possible to make a choice out of four or five architects; but in the present time, he must say, without wishing to detract from the merits of existing architects, there was no such towering genius as existed in days past; and, therefore, it was necessary to invite a large number of architects to compete. Among the names of the six first appointed he failed to observe the names of some architects who obtained prizes in a previous competition. If any hon. gentleman went to the City and walked down Lombard-street, Cornhill, and Broad-street, he would see buildings designed by architects worthy of following Sir C. Wren; and the public had a right to demand that those gentlemen should be included in the list of competitors. The condition that the tribunal deciding on the merits of the competing architects should be protected from the charge of favouritism, was essential; and he might mention that he had heard a report, which, however, he did not believe, that it was the intention of the commission to select Mr. Waterhouse, the architect of the Assize Courts in Manchester. As to the tribunal which was to judge of the merits of the competitors, it was important that it should be a competent one. The commission was to consist of five persons only, and he trusted that the Government would think twice before submitting this important question to the decision of a body so constituted. What he wished to urge was that the competition ought to be unlimited, or limited to so many as would afford a fair chance of a satisfactory selection, and that there should be constituted a tribunal in which the public could have confidence.

Mr. Beresford Hope, in the name of the architects who did him the honour to appoint him the president of their Institute, thanked the hon. member for bringing forward the motion, which was one rightly made by a member who was independent in the sense of having no connexion with architecture, and which, therefore, neither he nor the hon. member for Bath (Mr. Tite) could have made. When the competition for the Law Courts was first announced, it created an intense interest among the architectural profession. They were to form a magnificent building, which would be a glory to the architect and to the metropolis if he succeeded, or a misfortune and disgrace if he failed. When the list of architects first appeared, it included six eminent names. A feeling prevailed that the list ought to have been larger; but still no question was raised, and it seemed as if the number was a foregone conclusion. But then name after name dropped off, and other names were added, until only two of the first six names remained on the list. It was clear that a screw was loose somewhere; and where that screw was it was the object of the present motion to discover. Report said that certain conditions of competition were imposed after the architects had been invited to join in the competition. Now, whether these conditions where right or wrong, or whether it was wise or unwise to limit artistic freewill, at any rate it was not right to induce men to suppose that they were entering into competition on the usual terms, and when they had, as it were, committed themselves, to call upon them to sign unusual agreements, introduced for the first time into similar competitions, and of which they had received no previous intimation. It was no answer to say that an architect ought not to engage in more work than he could honestly exercise his intellect upon. That was very true in itself, but the Government ought to have let it be known early enough that it intended to alter the terms of competition, so that architects might not have been placed in a false position by declining so honourable an engagement in reality on account of things which did not concern the artistic side of the matter. The imposition of conditions would almost necessitate unlimited competition, which would allow of more stringency in the terms imposed upon the competition than limited competition. A limited one assumed the honour, ability, and industry of those selected, on account of their being known to possess such qualities; while unlimited competition might admit impractical scene-painters and dreamers, and the first prize might fall to a clever scamp, or an artist totally innocent of finance. While in his opinion unlimited competition would be theoretically the best, he was bound to add that in the present condition of art-politics it was impossible, and it was not asked for. The petition of the Institute of Architects which he presented, though applying technically to the competition for the National Gallery, was in spirit meant to cover this case; and as a rumour said it had been effectual in the manner of the National Gallery, he hoped it would be the same in this. The motion of his hon. friend afforded an opportunity for saving repentance on the Treasury bench, and he only hoped there would be no faltering between two opinions. He did not believe that those on the Treasury bench were altogether guilty. There was a grander and more august commission behind them, a commission whose behests they were, perhaps, only serving. He had approached a very dignified and influential quarter in the name of the Institute of Architects, and the reply was that six architects were too many. He trusted that the First Commissioner of Works thought differently, and would extricate his friends from their dilemma. The reason why unlimited competitions were not asked for was that they had been made ridiculous, and almost dragged through the dirt by the absurd mismanagement of the Foreign-office competition nine years ago. The story was an old one, but it was worth recalling. The Government wished to build two public departments, a Foreign-office and a War-office, which might and ought to have been two wings of the same structure, and ought to have been jointly competed for with designs including both. Instead of one there were three graduated schedules of prizes. One was for a block scheme for laying out the whole space at Westminster about the public offices, which, by the consent of every one, turned out a perfect failure. The first prize in that was won by a speculative Frenchman, who came full of a scheme for improving the smoky capital of perfidious Albion off the face of the earth. He need say no more of that branch of the matter. With respect to the other two schedules, it was forgotten to be settled whether competitors were to take prizes in one only or in both. Some went in for a War-office only, others for a Foreign-office, and some for a compound building, lodging both offices under the same roof, while others stuck two distinct houses side by side. But when the judges came to consider, they were in the same difficulty as the public to understand the meaning of the terms of competition, although men of avowed accomplishments. Amongst them was that accomplished gentleman the hon. member for Perthshire, who, he was happy to say, was also in the present list of judges. Lord Eversley and the Duke of Buccleuch, though named, were prevented from taking part in the practical work; but the rest who acted were, Mr. Brunel, to represent the engineers; Mr. Roberts, the great pictorial dreamer of architecture; Mr. Burn, the able and common-sense architect; and the Earl of Stanhope, the representative of high literary refinement. Mr. Burn thought that the same man might get the prize for both designs, but the majority said otherwise, and the result was a compromise schedule of prizes, which meant nothing, and such confusion and complication that no one knew what was to be done. Mr. Coe got the first prize for a Foreign-office, which could not grow into a War-office; and Mr. Garling for a War-office, which could not grow into a Foreign-office.* This was in 1857, and the matter, as it were, lay on the floor of the House. Nobody would touch it there. Nobody knew what was to be done. At last, in 1858, he (Mr. Beresford Hope) took it up, and obtained a select committee. In looking into the matter, that committee found it could make nothing of the formal award of the judges, and it fell back upon Mr. Burn's individual list, based as that was upon the non-exclusive principle. By that list it turned out that Mr. Scott, though first for neither office, was first in the general sum total of merit, being placed second for both buildings, and so he got the commission for a Gothic design. But how Mr. Scott, who thus got a prize for a Gothic building, was now engaged with Mr. Digby Wyatt in erecting an Italian design, it was not necessary to state. He had gone through this narrative to show why unlimited competition now stinks in the nostrils of the House. He was sorry it should be so. It was against the spirit of the age,—it was against the idea of free trade in art; but so it was. It would simply be a waste of time to move that there should be unlimited competition. What they demanded was, larger competition, and a little more variety in the composition of the judges. He did not wish to strike out the name of one legal or financial member of that body. They were all very useful elements, but he did plead for a larger infusion of the artistic element in the shape of architects, as well as for the educated amateur element; because, after all, the painter and the engineer were amateurs, as much as the well-educated country gentleman might be, and ought to be represented on the list of judges. Above all, he asked that the competition should really be competition—not to

* Messrs. Banks & Barry write as to this:—"In his speech, Mr. Beresford Hope alluded to the 'absurd mismanagement' of the late competition for the new Foreign-office, and proceeded to give a narrative of the proceedings, which (we are sure unintentionally), by omitting all mention of our names, has added to the very great professional hardship which we have suffered in this matter. The facts were really these:—We took the second premium for the Foreign-office for an Italian design. Mr. Scott took the third premium for the Foreign-office for a Gothic design.

As no style was laid down in the terms of the competition the abstract merits of the planning and designs of course governed the award of the judges.

One of these judges was an architect distinguished during a very long and busy professional life for producing plans of such eminently convenient arrangement that they have become notorious, and was therefore well qualified for his post, and his colleagues were equally distinguished for other special knowledge — practical, artistical, and the like.

The first premium for the Foreign-office was given to Messrs. Coe & Hofland, who were not, however, thought capable of carrying out the work; and then, by all logical reasoning, we considered at the time, and still consider, the work should have been placed in our hands, as taking the next place, and before Mr. Scott. Before the actual appointment of the architect, however, a change of Government took place, and for a short time Lord John Manners was the First Commissioner of Works, whose strong predilection for Gothic architecture is well known. Under his auspices the first three designs for the Foreign-office were referred to a Parliamentary Committee, who decided that Messrs. Coe & Hofland should not be employed, but that the merits of our Italian design and Mr. Scott's Gothic design were so nearly balanced that they left it in the hands of the Government; and, a few days before Lord John Manners quitted office, Mr. Scott was appointed architect for the works of the Foreign-office.

The hardship of our position is increased by the fact that although Mr. Scott was selected on the ground that his design was the first one premiated in the Gothic style, he is now engaged in carrying out an Italian design, while we took a higher position than he did in the award of the judges for an Italian design.

Without wishing to detract from any merits in the design now in course of execution, or from Mr. Scott's distinguished talent as a Gothic architect, we think it only due to ourselves to recall the above facts to public knowledge, and assert for ourselves the honour of the position we lawfully gained, but which has hitherto produced us no results whatever."

lead afterwards to a pretty show, or exhibition in Westminster Hall, but to have just so many designs and no more, and just so roughly done as would enable competent judges to decide who was the best man; for the competition was not meant to enable them to decide on the building in all its details, but to discover the man best competent to create the final structure. It was absurd to ask for finished drawings of every particular, such as the head of Edward I. peeping round the corners, or cornucopias standing out, or hall-door chairs in the style of the fourteenth century or the Augustan era. What was wanted was the master-mind to design the general idea, and the details might be worked out year by year, in concert between employer and architect. The abominable thing was the grand exhibition up to which everybody worked, with the art critics of the press and of the House, and the fine ladies and the fine ladies' daughters, and the constituents from the country, who came up to town ravening, like monsters of the deep, for something to see, whom hon. members took by the hand and led to Westminster Hall. He would let them into a secret of the trade. There was an exhibition of designs; at length one was pitched upon; it seemed uncommonly fine. It was a magnificent building. There was a beautiful sky-line, plenty of trees, and an officer of the Horse Guards was prancing by—everything, in short, that made it very effective to the innocent mind of an uneducated amateur judge. Who produced it? The talented architect to whom they meant to give the prize? No; but some member of a very respectable but hybrid profession—an architect's artist; in fact, a water-colour painter, who has acquired just such an amount of architectural proficiency as may enable him to take the drawing of the architect, and out of that to concoct the pretty seductive pictures they saw at exhibitions, and to which the prizes were awarded by judges who very likely had no idea whether it indicated an elevation of 200 ft. or 500 ft. in length. This is what made these competitions distasteful; it showed also the incompetency of the judges, and could only lead to work which was untrue and meretricious. To prove that this was not his opinion only, he would read extracts from two letters he had received from eminent architects:—

"As regards the necessary drawings for a competition, it is certainly a great drawback to all architects who compete that they should be compelled to send in so many drawings, which really are unnecessary for the purpose of selecting the architect. The great point, of course, is for him to give the general scheme and style of his design. This can be very effectually done by sending the principal plans and elevations, and one main section with perspective views. These would be quite sufficient to form a correct estimate of capability of the architect to carry out the design well without putting him to the trouble and expense of needless sections and constructional detail. We know, from architects' experience, that in nine cases out of ten the latter are never even glanced at. You would be doing architects great service if you could prevail upon those who have to draw up particulars to practically consider this important question."

The second communication was from a gentleman whom he had asked whether he would compete:—

"I may say that I should certainly have accepted but for two reasons,—first, the shortness of time. There will be, I understand, from sixty to seventy drawings required. These sixty or seventy drawings will have to be got up within some eight months from the present time—*i.e.*, an average of about four days to each drawing. In addition, the whole subject has to be got up, which always takes more time than the mere drawing. I therefore think that the time is far too short, and near a year, at least, should have been allowed to the other competitors. The second objection is the absence from among the judges of professional men."

Rumour, with its many tongues, has given as a reason for the limited competition that the lawyers were afraid lest their courts should be beset with architects studying the judicial procedure. But surely architects had some idea of business, and had some *à priori* ideas to work upon, and knew what a bar meant,—and that a room constructed to suit a Tower Hamlets' vestry would not be unfitted for even the High Court of Chancery. He hoped that so groundless a panic would not palpitate under the horsehair of their wigs. Here, then, was a grievance. It was a grievance to the judges as well as to the architects. Even if they looked conscientiously at the sixty or seventy designs they would not derive much benefit from them, but rather confuse their own judgment. If the number of drawings asked for from each candidate were reduced, it would be as easy for the judges to look at those of twenty, as the half-dozen more ponderous sets they now required. What they wanted was, not the tricked-out, burnished pictures of architects' artists, but clever pen-and-ink sketches, the virgin ideas of the architects themselves, the work of their own hands. The honour and credit of the country demanded that the artistic, as well as every other element should be kept up at its due level in the body politic. There was a point of honour, a high and ennobling ambition, with architects as with all other professions, and this it was right and needful that those in authority should respect and encourage. No such means for encouraging it existed as liberal competitions. The architectural character of London should be a glory, and not a disgrace, to the age; and it was stingy and selfish to grudge a little trouble to help that by opening public competition somewhat more. All had an interest in this question, in order that our metropolis, with its wealth and pomp, bustle and business, should not fall behind the petty capitals of foreign despots. Under all the circumstances he hoped that success would follow the motion of his hon. friend, and that the right hon. gentleman (Mr. Cowper) or the Attorney-General would gracefully yield a bloodless victory, and in that assure the House that the matter would be considered, and justice done in this case, and that their moderate and respectful petition would meet with that favourable reception to which it was entitled.

Mr. Cowper said that the object of the commission was to secure the means of getting the best Palace of Justice they could. The House had authorised the expenditure of a million and a half of money for the concentration in close contiguity of all the courts of law and equity, of the Probate and Divorce Courts, and of all the offices, because it believed that such an arrangement would be attended with most material and beneficial results on the administration of the law. Indeed, it was generally allowed that the dispersion and distribution of the courts and offices were the means of impeding very many of those reforms which would tend to promote the fusion of law and equity, which some very learned gentlemen advocated and desired. But, whatever might be the benefits that would result, it was quite clear that the actual construction of this building was a very important affair, and it was one to which the Courts of Justice Commission had specially directed their attention. They had to find a man of the greatest eminence in his profession, and who had also minutely and carefully studied the whole subject, which was one that did not come under the ordinary cognisance of an architect. Now, if there were any architect of sufficient eminence to make it certain that he would adequately and satisfactorily discharge the duty of erecting such a Palace of Justice as was required, it was, in his opinion, better to select an architect than to invite competition. The most eminent architects, however, were not men who had paid special attention to this subject; and, therefore, it was not possible to make a satisfactory selection. Under the circumstances, it was considered the wisest course to select a small number of men who might safely be intrusted with the building, and invite them to compete with one another. But then it was necessary that these architects should study for at least seven months the minute details of the required building. Arrangements had accordingly been made that the selected architects should have access to the courts and offices at particular times, in order that they might be enabled to see how the business was transacted, and thus by their own eyes and their own judgment ascertain what kind of building would be best adapted for the business carried on. The Courts of Justice Commission had prepared a very elaborate schedule, showing in great detail all that the committees appointed by the Commission thought necessary to be provided. The hon. member who last spoke had given the House a long string of obvious reasons why a limited competition succeeded in ordinary cases, but it was clear that it would have been the worst method that could have been adopted in this case, for such a careful study of the subject was required during the busiest time of the year that scarcely any of the most eminent men would have taken their chance in an unlimited competition. The Commission had, therefore, decided that not more than six architects should be invited to compete, and those architects were to be properly remunerated for all the labour and expense incurred by them in getting up the drawings and studying the question. Now, it was quite true, as his hon. and learned friend had said, that out of the six architects originally appointed four had retired. He thought, however, that the very fact of their retirement justified the view he had taken of the great difficulty of getting eminent architects to give their attention to a question of this sort. One of those who had retired stated that he had enough business on hand, and that, consequently, he could not undertake so laborious a task. Another had stated that, if more time had been allowed, he might have been enabled to compete, but in this busy time of the year he was already fully occupied, and could not undertake to give the time and attention necessary for the study of the subject. The other architects had objected to one of the clauses in the agreement proposed by the Treasury, to the effect that the architect finally selected should not be allowed to undertake any new work except with the consent of the Treasury. Of course, the Treasury would not have pressed that in any undue way; but the clause was intended to secure that an actual and personal superintendence should be given to the building by the architect employed. The vacancies which had occurred had been filled up, the resolution of the Commission being that six architects should be asked to compete. He was not one of those who spoke so strongly against unlimited competition as the hon. member who had just sat down. It was true that, in the present state of public opinion, unlimited competition was not acceptable; but in his opinion it ought to be acceptable. His opinion was, that if a building were required which the education and ordinary practice of an architect would enable him to design, it was advantageous to have the competition open to all the world. That was the plan adopted last year, when a new building was wanted at Kensington Gore. The result was, that an admirable design by Captain Fowke was selected,—a design which probably would not have been attained if the competition had been limited. The present case, however, differed entirely from that. The object was to get the very best Palace of Justice in the world. There must be arrangements under which witnesses might be separated from the public and the legal profession, while the public might have the opportunity of hearing, and yet not be able to attract the attention of the judge, the jury, and the witnesses. Altogether he believed that the method of competition which had been recommended was the one most calculated to attain the desired object. He could not admit that, because a man gained a prize nine years ago in a particular competition, he therefore had a right to have a share in the present competition. What was desirable in such a competition was not merely to get men who had succeeded in making a pretty drawing or sketch, and obtaining a prize from judges who might or might not have been competent to award it; but men who had achieved celebrity by actual work, and could show their talent in stone, brick, or mortar. The hon. member for Norfolk had spoken of a rumour that there was a desire to show special favour to Mr. Waterhouse; but no such feeling had ever existed in his own mind, nor, he believed in those of his colleagues. In fact, they abandoned the idea of appointing him architectural clerk, lest any suspicion of favouritism should arise, and the schedule of dimensions would be as open to the other competitors as to that gentleman. As to the selection of the judges, they represented the different classes interested in the building, two of them being eminent members of the legal profession, two being members of the Government, and the fifth being the hon. member for Perthshire, who represented the general public. This was analogous to the ordinary practice, that those who were proprietors should determine the kind of building they wanted; and it was quite open to the judges to call in professional assistance in examining the drawings, as was done in the case of the Foreign-office and the War-office.

Mr. Tite said he had been appealed to once or twice in the course of the debate, and more out of the House than in it, in consequence, he supposed, of having once occupied some position in

the profession, and of having filled the office of president of the Institute of British Architects, in which his hon. friend, the member for Stoke-upon-Trent, had followed him. He supposed he was the only man in that House who had gone through a public competition of a somewhat similar character to that which they were now discussing, and he felt bound to say that much of his success in life was due to the fact of having been brought forward as a young man by public competition. In the very House in which they were assembled, though he quarrelled with its style and much of its decoration, they had in its wonderful arrangement and in the fact that so little alteration had since been necessary, another signal instance of the good results of public competition in the person of Sir C. Barry. It was not through the desire of that eminent artist that the building was covered with sprawling dragons and unknown monsters. The style was dictated to him, and, *doctus utriusque linguæ*, he soon showed himself as accomplished in this style of architecture as in Italian, of which he was so great a master. The merits of any design consisted, not in a mere decorative drawing, but in the arrangement of plans, rooms, and courts, and he could conceive nothing more difficult than the details which had to be carried out in the distribution of both Houses, the committee-rooms, and all that belonged to them, preserving at the same time the important features of Westminster Hall, St. Stephen's Hall, and approaches, all of which had been so happily managed. As regarded the present competition, he did not at all wonder that suspicion had been excited by the small number of competitors. Of course, with the six gentlemen who had been selected all idea of jobbery was out of the question; but the number of six was so extremely limited that it certainly created in the minds of the architectural profession an impression that, to a great extent, a foregone conclusion had been arrived at. There was obviously no difficulty in increasing the number, for four of those who were originally named having withdrawn, four others were nominated in their places. Had ten or twelve gentlemen of the highest eminence been nominated in the first instance, he ventured to think that the time of the House would never have been troubled with this discussion at all. The same observations might apply to another competition now under consideration, that relating to the National Gallery, and the observation of two or three practical rules would tend very much to set such questions at rest. In competitions wisely conducted there should be no ornamental drawings, or, at most, but one consisting of a single colour, Indian ink, or sepia, or something of that kind, so as to prevent the ornamentation and frippery and misleading details so often brought forward to influence the decision of the judges. As to what had been said with regard to expense, he did not think it worth talking about. 800*l.*, he understood, were to be paid to each of the six gentlemen; and, if that number were increased to ten, there would be a trifling increase of expenditure; but was that amount to be thought of when they were going to spend upon courts of law, a work of the greatest possible importance, a sum exceeding 800,000*l.*? It was, of course, a question for his hon. friend, Mr. Bentinck, whether he would divide or not, but he ventured to ask him to leave the matter in the hands of the Government; if, however, the matter were pressed to a division, he must affirm the principle that the number of competitors ought to be greater than that which had been selected. He wished the Government, rather than adopt a miserable competition of six, had had courage sufficient to choose one man, and place the matter in his hands at once. At St. Thomas's Hospital they had avoided all difficulty by taking this course; across the water they were perfectly satisfied with their architect, and everything connected with the building would be done, and done, he believed, ably and well. As evidence of the existence of rising talent, he would mention one fact. One gentleman had written to him, saying,—"Ought not I to have a chance?" He would not mention the name of that gentleman, but the list of his attainments was very striking. He obtained three silver medals of the Royal Academy in 1850, the gold medal and life studentship of the Royal Academy in 1851, he was elected an Associate of the Institute in 1852, obtained the medal of merit and a humble prize that he himself gave the same year, passed the first examination in the next year, and obtained the Travelling Fellowship of the Royal Academy, and also the Soane medallion of the Royal Institute of British Architects, in the same year; had since travelled, and was one of the best draughtsmen of the day; and yet, owing to the naturally humble position of that gentleman, unless he distinguished himself through some such opening as the present competition, he was likely to end his days as a mere surveyor or builder of ordinary dwellings. He felt bound by a sense of duty to the profession to which he once belonged to offer these remarks, and he hoped that the Government would not refuse to increase the number of architects who were to compete.

The Attorney General explained the position of the Commissioners, and spoke against unlimited competition in such a case. As to the judges, he said, of course they would have the advantage of due architectural assistance should they require it, and he thought that confidence might be placed in their desire to secure the most beautiful building consistent with utility.

After other speakers had addressed the House, Mr. Bentinck's motion was carried by 101 to 70.

RAIN-WATER PIPES TO VENTILATE DRAINS.

As I find in a report of the engineer of the Metropolitan Board of Works that the rain-water pipes can only be used "when there is no fear of the gases descending again into the chimneys and windows," and as such descent must often take place and be dangerous to the health and even life of many persons, I trust you will permit me to send you the enclosed plans for its prevention. I have succeeded in freeing my own house *practically* and completely from these effluvia from the drains, which descended through a skylight in the roof. My invention is a simple and inexpensive one, and I am anxious for its publication, as it may be the means of saving many a family from fevers, cholera, and other diseases, which are so much fostered and aggravated, if not created, by the foul gases from drains, of which all rain-water pipes are more or less the ventilators.

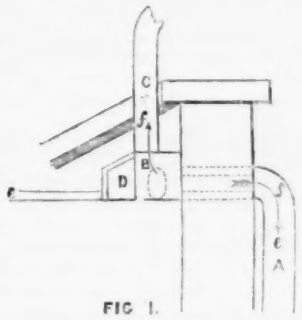


FIG 1.

A. Rain-water pipe.
B. Three sides of a box applied to the opening of the rain-water pipe on to the gutter.
C. A zinc tube, of about 3 in. diameter, carried a few feet above chimneys or skylights; 2 or 3 ft., I believe, quite sufficient.
D. A piece of cloth, or other material, suspended under the top of the box, acting as a valve.

The foul gas rising takes the course of the arrow off the valve D, preventing its passage to the gutter.

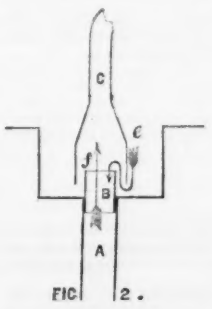


FIG 2.

I suggest this plan to apply to another water-pipe:—

A. Rain-water pipe.
B. A short piece of pipe fitting tightly into pipe A.
C. A zinc pipe fixed as most convenient, leaving a space equal to the area of mouth of pipe B round pipe B.

Here the arrow, *f*, shows the course of the gases; *e* that of the rain-water. The only objection to these plans is that the gas-trap in fig. 2 may be choked with leaves, &c.; to which I can only reply, that it is far better to have an obstruction at the top than the bottom of the rain-water pipe, as at the top it is much more easily removed. I am sure that you will accept any effort for the public good. J. PERCY.

WOLVERHAMPTON TOWN HALL COMPETITION.

OUR readers are aware that some months ago the special committee charged with the duty of obtaining plans for a new town-hall and other public buildings for Wolverhampton, selected two designs from a number of competing designs for the first and second premiums of 100*l.* and 50*l.* respectively, but the condition upon which the committee undertook to recommend the town council to award the premiums to the authors was that they could each be carried out for 15,000*l.*, the amount stipulated in the specification. It is no secret that the design selected for the higher premium was sent in by Mr. Bidlake, of this town; and that that of Mr. Bates, of Manchester, was the work placed second in order of merit. Both designs, with a copy of the instructions issued to the architects, &c., were forwarded to Mr. Waterhouse, architect, for his opinion as to whether they could be carried out for the amount specified. We learn that his report has been received, and is to the effect that the probable cost of carrying out Mr. Bidlake's design, minus the tower, would be about 25,400*l.*, and that the tower would involve an additional expenditure of between 500*l.* and 600*l.* He thinks the execution of Mr. Bates's design would probably cost about 25,000*l.* The commiitee have in consequence rejected both designs, and resolved to send two others, which stood next on the list in their estimation, to Mr. Waterhouse. One, bearing the motto of "Salve," is by Mr. Christopher Wray, of London; and the other, distinguished by the motto "Perceverando Virices," was sent in by Mr. Lloyd, of Bristol. The first premium will be awarded to Mr. Wray, should it be found by the report of Mr. Waterhouse that it can be carried out for 15,000*l.*

THE LAW COURTS COMPETITION.

WE have elsewhere reported at some length the recent debate in the House of Commons on this subject, and the decision there come to. The resolution of the House has been forwarded to the Commission; but, as the Commissioners are mostly out of town, it has not yet been brought under their consideration. They will doubtless now recommend to the Treasury an extended list of competitors.

LABOURING CLASSES' DWELLINGS BILL.

THE Commons have passed this Bill through a committee of the whole House.

On the clause referring to the loan of money by the Government for the building of these dwellings,

Mr. Ayrton disapproved of the proposal that public money should be advanced to builders at 4*l.* per cent. for the building of dwellings for the labouring classes. If a builder went to the open market for money he would have to pay 6*l.* per cent., and a rival builder might take another plot of ground near that on which houses were being built out of money lent at 6*l.* per cent., and get a loan at 4*l.* per cent. Was it right that the public money should be made subservient to the purposes of that rival builder? He thought the Government ought to strike out of the bill the provisions which enabled them to lend public money for private speculation. The bill should be limited to public bodies called upon to make public expenditure for a public object.

Mr. Childers said that as a matter of abstract political economy his hon. friend was correct, and on the mere dry ground of political economy the Government would not be justified in advancing any money at all for any objects except those which were strictly of a public character; but they had to deal with this fact, that unless Government rendered some assistance in this direction there was a great unwillingness on the

part of persons to enter into sufficiently large building operations for houses for the working classes, and there had arisen in consequence a scandal to this country, which was particularly apparent in the metropolis and other large towns.

Mr. Hughes said that the building societies dealt with a class of houses distinct from that dealt with in this Bill. At present the poorer classes were frightfully overcrowded, and this bill would meet a considerable want.

Mr. Ayrton again suggested that that portion of the bill under which money could be advanced at 4*l.* per cent. to manufacturers "to speculate" in building cottages should be omitted; and moved an amendment to that effect.

Mr. Akroyd suggested that the rate of interest should be reduced from 4 per cent. to 3½ per cent.

Mr. Childers explained that the Treasury would make regulations with regard to the class of buildings for which loans would be made. If building societies could give proper security they would get loans under the Act.

The amendment was negatived.

Mr. Childers stated that a similar Bill would be introduced for Ireland.

The clauses having been agreed to, and a new clause added providing that the rules and regulations made by the Commissioners of the Treasury should be laid before Parliament, the preamble was agreed to, and the chairman was ordered to report the Bill.

BRISTOL STREET IMPROVEMENTS.

A GOVERNMENT inquiry has been held at the offices of the Local Board of Health before Mr. Arnold Taylor, into the several schemes for street improvement decided on by the Local Improvement Committee (who are the Local Board of Health) of the Town Council. The Home Secretary has sent down the commissioner in consequence of a petition having been presented to him by the Board praying that they may be allowed to put in force, with reference to certain lands and buildings within their district, the powers of "The Lands Clauses Consolidation Act, 1845," with respect to the purchase and taking of lands otherwise than by agreement. The commissioner said the present proceedings were merely preliminary. His object was only to obtain evidence to guide the Home Secretary in coming to a decision on the merits of the schemes. Mr. R. P. King, as chairman of the committee appointed by the Town Council, made a few remarks on some of the schemes, and pointed out the necessity there existed for the improvement of the bottom of Park-street; the making of the new road to the Terminus from Bristol Bridge; the importance of the access to Clifton *viâ* Park-row and Maudlin-street, and the importance in St. Jude's. The following schemes were then considered, except the last, the property for it having been purchased:—

1. The making of a new street from the junction of Thomas-street and Bath-street to the terminus of the Great Western Railway, and the connecting Avon-street with the proposed new street.
2. The widening, altering the gradients of, and otherwise improving Cow-street and Park-street, and also Frogmore-street and Frog-lane, at their junction with the said two last-mentioned streets, and the raising the level of Hammer's-buildings.
3. The making a new street from the south-west corner of College-green to St. George's-road, at a point between Brandon-street and Partition-street, and the widening and improving the north side of St. George's-road, between York-place and Waterloo-court.
4. The widening and improving of Bond-street.
5. The making a new street from the east end of Park-row to the west end of Maudlin-street.
6. The making a new street from Wilder-street at the point opposite York-street to a street called Backfields, and widening that part of the street called Backfields, which runs towards Stoke's-croft.
7. The widening and improving Lodge-court, New-street, Poyntzpool, and Butcher's-row.
8. The widening and improving the north side of Nicholas-street.

During the inquiry the several surveyors described the plans, and stated the features of the proposed improvements. The gross estimated cost of the whole (except the last) is 158,294*l.*; but this is exclusive of large returns which are expected to accrue from the improvements, considerably reducing the cost to the city,—in one instance, it is anticipated, covering the whole of the cost of the improvement. Schemes 1 and 2 were opposed by several persons, but supported by a larger number: the others were not opposed at all. The commissioner spoke decidedly in favour of Temple-street and Park-street improvements. In reply to a remark made by Mr. W. Herepath, Mr. King said they would not require more than 12,000*l.* at any one time, and this would be repaid by a fivepenny rate for the first year, gradually reduced at the end of thirty years to about a twopenny rate.

COMPENSATION.

DR. J. H. ROBERTS *v.* THE ST. JOHN'S WOOD RAILWAY COMPANY.

THIS inquiry was held on the third instant, before Mr. Pownall, the sole arbitrator. Mr. Hawkins, Q.C., and Mr. Cole appeared for the claimant; and Mr. Lloyd for the Company. Mr. Hawkins, in stating the case, said that the claimant held No. 10, Finchley-road, for an unexpired term of 24 years, at 100*l.* a year, where he carried on the profession of a surgeon. On receiving notice to treat he applied to the Company for some other house; but failing to obtain another from the Company, he purchased the long lease of the only house to be had in the main road at the corner of Adelaide-road, nearly half a mile nearer the Swiss Cottage. The price for the 74 years' lease, at a ground rent of 35*l.*, was 2,150*l.* And, though the house and grounds were more valuable than his old house, Dr. Roberts had to lay out 1,500*l.* in making additional rooms to equal the number of those in No. 10. The question was as to how these sums should be dealt with, and how should Dr. Roberts be compensated for his forced removal. Had he not taken this house his practice would have been destroyed, and his claim for compensation would have amounted to 6,000*l.*; he was, therefore, justified in taking the new premises, thereby reducing his demand for compensation to scarcely more than half that sum, by saving his practice and thus benefiting the Company. Dr. Roberts having proved the facts, and given an account of his practice, the following valuations were given on the two sides.

For the claimant:—		
Mr. E. Roberts.—Cost of new premises and ground-rent, equal to per annum		£166
Two-thirds of alterations ditto		61
Extra rates and taxes		30
		£257
Deduct present rent	£100	
Ditto stables	15	
		115
Extra outlay per annum for 24 years		£142
This at 6 per cent. table		£1,782
Unproductive outlay		500
Household removal		320
Loss by double rents, and personal trouble and loss of time		250
		£2,850
Depreciation of practice, say		1,000
		£3,852

Mr. Orridge and Mr. Lara, medical agents, proved that on the removal of a practitioner one-third of the practice was considered lost, and would be valued at three years' purchase.

Mr. Shaw valued the old house at	£160
Deduct reserved rent	100
Profit rent	£60
For 24 years, worth	£750
Ten per cent.	75
Consequential damage: consisting of a loss of 1 per cent. in table on the outlay of 3,650*l.* in new house	639
Loss of rent	80
	£1,544

To which should be added a sum for removal, fixtures, and personal trouble, and for interference with the practice.

Mr. Dent.—Profit rent of old house £55 for 24 years, and 10 per cent. added	£766
Removal	200
Twenty-five per cent. of outlay on new house	912
Loss of rent, besides loss of practice and personal trouble	105
	£1,983

For the Company:—		
Mr. Lomax considered the old house fully rented, and that the fixtures were worth 291*l.* 11s., including some iron buildings not taken at rental value.		
Mr. Toplis valued the profit rent at 15*l.*	£179	0
Ten per cent.	18	0
Fixtures and iron buildings	245	8
	£443	8

Mr. Lloyd argued that though the "reinstatement" view of compensation was sometimes proper, there never was a case in which it would be more improper to apply it than to this. The removal from a small and unimportant to a large and imposing house was a benefit and advantage to Dr. Roberts, and his outlay was a judicious and beneficial expenditure. His witnesses nearly agreed with Mr. Shaw as to the annual value, after allowing for iron buildings, 30*l.* a year. He summed up his view of the figures as follows:—

Mr. Toplis's valuation, with 10 per cent.	£197
Fixtures and iron buildings	292
Removal	200
Loss of rent	100
	£789

Mr. Pownall's award, just published, is 1,955*l.*, thus appearing to adopt the "reinstatement" view.

PRIZES FOR ART-WORKMANSHIP.

THE Society of Arts, as we said would be the case, have added the following valuable clauses to their programme of prizes, enlarging the basis on which artisans may compete for prizes for art-workmanship:—

"Any producer will be at liberty to exhibit, either in his own name or through his workmen, any work or works as specimens of good workmanship in the classes given below, provided that the work or works be accompanied with a statement of the name or names of the artisans who have executed their respective portions; and, if the work or works be sufficiently meritorious to deserve them, extra prizes will be given to the artisans who have executed them.

Artisans may, if they think fit, exhibit works executed by them after other designs than those mentioned, in any of the above-mentioned classes. Such works may or may not contain the whole or portions of the prescribed designs, but must be of a similar style and character. Competitors must specify the class in which they exhibit. Extra prizes will be awarded."

The works submitted will be exhibited at the Society's house, and afterwards at the South Kensington Museum. The best of them will then be sent to the Paris Exhibition of 1867.

BANKRUPT'S MATERIALS.

Re W. Flint.—An application was made in the Court of Bankruptcy, for an order to sell some property which was in the order and disposition of Mr. Heam. It appeared from the statements on both sides that the bankrupt was a builder, and employed by Mr. Heam to build him three houses on his own freehold at Wood-green. Just before the houses were completed one fell down, and the parish officers had requested the others to be removed, as dangerous to the public. On the premises were some materials and other articles, which the assignee now claimed on the part of the estate, as being in the order and disposal of Mr. Heam. Mr. Commissioner Winslow said the application could not be entertained in the manner proposed. The section only applied to property in the order and disposal of a bankrupt. He would, however, hear the case, if both parties would submit to the jurisdiction of the Court. The solicitors for Mr. Heam and for the assignee willingly offered to abide by the decision of the Commissioner, to save ruinous litigation. There were three actions—one by the architect, one by Mr. Heam against the architect, and another action had been commenced. The assignee could bring an action against Mr. Heam to recover the materials now on the houses, which, it was feared, would have to be pulled down, and others built in their stead. Already Mr. Heam was about 1,000*l.* out of pocket. The contract for the houses amounted to upwards of 2,000*l.* The builder alleged that it was not his fault, and the architect protested that it was not his fault. The property in the premises Mr. Heam claimed, and submitted that he had a claim on the bankrupt for 1,000*l.*, and was clearly entitled to hold what little property was on the premises. The assignee insisted that it vested in the creditors, and he might bring an action unless the litigation could be prevented. The Commissioner expressed his readiness to decide the case if it would prevent further litigation. The parties could agree to a special case, and if they submitted to the jurisdiction of the Court he would go into it, and his decision, except an appeal to the Lord Chancellor, would be final. Both gentlemen embraced the offer, and the matter stands over.

DO WHITE BRICKS SWELL?

SIR,—I shall be obliged to any of your correspondents who will kindly inform me what is the best thing to do under the following circumstances. About two or three years ago I built a house, using the best perforated white bricks for the front, and the ordinary solid hand-made ones for the back and sides. The house is in a very exposed situation, and the front being about south-west, is exposed to all the storms that come from that quarter. I was astonished soon after it was built to observe numerous cracks in one of the front rooms, which have gradually become larger. I at first thought there might be something the matter with the foundations, but the position of the cracks seemed to preclude that idea. They run entirely across the *piers*, some of them nearly *horizontal*, and the brickwork outside seems much disturbed, also, not in any particular crack (except at the end, where the front at the top of the building has parted, with a diagonal crack, from the end of the house, which I attribute to the rising of the front), but the whole of the joints are disturbed. From these circumstances I have come to the conclusion that the mischief is to be attributed to the swelling or heaving of the white bricks. I am the more readily led to think so from having to take down part of one low boundary-wall and rebuild it, the end of it having pushed an oak post very much out of the upright. A dung-pit, built also with white bricks, is tumbling down, apparently from the same cause, the corner being pushed quite out of its place. But the difficulty is, what to do with the house. I thought of stuccoing it, thinking if the bricks were protected from the wet there would be nothing farther the matter; but, leaving the expense out

of the question, I do not like stuccoing where it can be avoided. Is there any preparation that the bricks could be coated with that would not alter their appearance, and yet would prove effectual and lasting in excluding wet? This puts me in mind of another circumstance, which seems to point to the heaving of the bricks as the cause of the cracks, viz., that only lately the wet has blown through the front wall, and made the plaster quite damp. I should feel much obliged for any suggestion, and beg to apologise for trespassing so much on your space.

A BUILDER.

P.S.—I believe it is a known fact that the white bricks of some localities swell or heave in the walls after building.

THE PORTSMOUTH BELLS.

SIR,—A paragraph copied from the *Builder* has been going the round of the newspapers, giving a description of the peal of bells in the parish church at Portsmouth. It speaks of the bells having "long been silent,"—until, indeed, they were recently rehung by Messrs. Mears & Stanibank. The bells have at no time (at least, within the last eight years, during which I have been acquainted with them) been disused. On the contrary, they have been regularly rung on both every ordinary and extraordinary occasion on which their services have been required.

Regularly three times every Sunday have they been used during all that time, and if you had heard them on the Prince of Wales's wedding-day, and on the recent visit of the French fleet, you would have been satisfied that they were accustomed to make themselves heard.

The fact is, that from many years' use, the clappers were gradually wearing away one side of the bells, so it was necessary (in order to prevent the latter getting too thin in that particular part, and thus cracking), to rehang the bells, turning them round so that the clapper should now strike on a sound part of the bell. This has been just done, and if the bells have been for any time silent, it was during the few weeks when this alteration was being effected.

I venture to make this correction in justice to our town. It would have been greatly to the discredit of the people of Portsmouth had they allowed their fine old bells to remain, even for a week, silent for want of the necessary repairs. I am sure this would never have been the case.

N. HOWARD MCGACHEN, Curate of Portsmouth.

EARTH AND SEWAGE.

SIR,—Your correspondent, "Sano," asks where the system of deodorizing sewage by using earth in connexion with privies has been employed, and desires to have any information bearing on the subject.

I would refer him to some very interesting and instructive experiments made at the large jail of Alipore, near Calcutta, by Dr. James Fawcus, of the Bengal medical service, and published in the last number of the *Indian Annals of Medical Science*. They are the best and most conclusive of any that I have met with, and (in all hot countries, especially) ought to lead to great practical results.

That earth containing *much* organic matter should deodorize fæces more rapidly than earth containing little organic matter (as Dr. Fawcus's experiments seem to prove), will be a *new* and practically very valuable fact for sanitary reformers.

DAVID LIEBCH.

GLASS IN CHURCHES.

SIR,—I should be glad, through your columns, to ask the opinions of architects, and others interested in church architecture, on the following point:—

As we are now using, generally, sheet-glass in large sizes with such great benefit in *house architecture*, is there any reason why the same kind of glass should not be used in *church architecture*?

The new system of sheet glazing is much warmer, and affords better light than the old small square and diamond panes. The use of *small* panes was, I imagine, universal in church architecture because *large* panes were not to be had; they had, I suppose, no connexion formerly with the architectural designs of the churches. May we not, then, utilize the present system of glazing for church architecture as well as for houses?

A PARISH PRIEST.

CHURCH-BUILDING NEWS.

Leicester.—The north and south chapels of St. Martin's Church have recently been restored, and reopened. The north chapel has been rebuilt in the Perpendicular style on the old foundation, except a buttress which was removed to improve the arrangement of the windows. In taking up the old chapel, many fragments of stained glass were found, which showed that one of the windows had formerly been of stained glass. The north and east walls were lined with the monuments of the Herrick family, which have all been taken down, and refixed in their former positions. The south chapel, which was originally in the Geometrical style, has, in order to make it harmonise with the chancel, been entirely pulled down and rebuilt in the Perpendicular style. The dressings and wallings of both chapels are built of Matlock Moor (Derbyshire) stone; the mullions and tracery of Corsham stone; and the inner jambs and arches of Attleborough stone. The roof-panellings are of wainscot oak, and the beams of Memel timber. The carved work is decorated in gold and other colours. The beams of the roof are supported by some carved angels by Mr. Gaghan, who has executed the stone carving throughout. The decorations of the roofs have been done by Mr. F. Winks, of this town, and the plumbing work and glazing have been done by Mr. Widdowson. The contract for building has been carried out by Messrs. Neale & Sons. The architectural details and the superintendence of the work devolved upon Mr. W. Lindley, who carried out the plans of Messrs. Braddon & Freshwater, the architects. The south chapel has been entirely restored by Miss Nedham, and the north chapel has, we understand, been restored partly at the expense of the Herrick, Macaulay, and Palmer families, and partly out of the restoration fund.

Geldeston.—The church here having become dilapidated from time and neglect, was closed for restoration at Easter, 1864. The interior has been re-seated with open benches of stained deal, and repaved with encaustic tiles, by Messrs. Maw & Sons, of London. A new pulpit and reading-desk of stained deal have been provided; the roof has been repaired and slated, and a new transept erected on the north side of the church, with a north window of four lights, in the Perpendicular style. The transept opens into the church by two pointed arches, supported by a pillar of polished granite, with a capital of carved foliage. The principals of the roof are supported on corbels of carved heads. The porch has also been restored. Mr. J. Clemence, of Lowestoft, was the architect. The cost of these restorations will be about 630*l*. The chancel has been rebuilt and enlarged by the rector. It is built of flint and Bath stone, in the Decorated style of the fourteenth century. The east window is of three lights, with geometrical tracery and pillars, with carved capitals supporting the arch within and without. The two south windows, and another on the north, are each of them in two divisions, the arches supported on pillars with capitals of carved foliage. The finials of the arches, the bases of the capped buttresses, and all the external carved pieces, are copied from specimens of the foliage of the plants and trees of the neighbourhood. The ten principals of the roof are supported on corbels carved. The carving was done by Mr. Philip, sculptor, of London, the encaustic and enamelled pavement by Messrs. Minton & Co. The communion-table and chancel-seats are not yet finished, but they will be of carved oak, of the style and character of the rest of the chancel. Part of the north side of the chancel is not yet completed, as room is left for a vestry, or for the completion of this side by another window and a new priest's doorway. Mr. Thomas Penrice, of London, is the architect of the chancel. In digging the new foundation of the chancel, a large portion of a cinerary urn was found 4 ft. beneath the surface, which the authorities of the British Museum have pronounced to be Anglo-Roman.

Books Received.

Happy Homes for Working Men; and How to Get Them. By JAMES BEGG, D.D. London: Cassell, Petter, & Galpin. Edinburgh: James Nichol.

THE Rev. Dr. Begg's views have been for some time before the public; and the press generally, the *Builder* inclusive, has already brought them under notice. This volume, besides a general view of the question, including, especially, a history of the Edinburgh Co-operative Building Company, and a statement of what is still necessary, contains a reprint of a lecture by Dr. Begg, delivered at Edinburgh in 1851; a prize essay, by Mr. John Symington, a compositor; and other relative matter. The well-written essay referred to is titled, "How every Man may become his own Landlord;" and the whole volume is full of useful and suggestive matter in relation to the important subject of which it treats. Illustrations are given of the (externally not very attractive) homes already provided and in course of formation at Edinburgh.

Miscellanea.

IPSWICH AND SHIPS.—"An Ipswich man" is not contented to have it said that Ipswich affords little accommodation for the repair of vessels. Other inhabitants of the town, however, think differently, and are anxious to improve it.

RHYL NEW PIER.—There is now every reason to believe that the long-talked-of pier is to be built. Iron work to the weight of 600 tons has arrived at the station, and the greater part was removed to the beach on Wednesday last under very unfavourable circumstances, the weather being wet. The first pile was driven in.

VITREOUS BRICKS.—Sir: Could not bricks be vitrified by inserting in the centre of each (while being moulded) *pulverized glass* mixed with saltpetre, nitre, soda, salt, alum, potassa, ammonia, litharge, or any compound that would cause the crystal to ferment through the porous mass, but not to exude, while under the process of burning?—R. T.

WHAT IS AN ACRE?—30¼ square yards make one square pole, 40 poles one rood, and 4 roods one acre English; thus, $5\frac{1}{2} \times 5\frac{1}{2} = 30\frac{1}{4} \times 40 \times 4 = 160$ poles, or 4,840 square yards. 36 square yards make one pole, 40 poles one rood, 4 roods one acre Scottish; thus $6 \times 6 = 36 \times 40 \times 4 = 5{,}760$ square yards. 49 square yards make one pole, 40 poles one rood, four roods one acre Irish; thus, $7 \times 7 = 49 \times 40 \times 4 = 7{,}840$ square yards.

PROPOSED MEMORIAL TO THE DEAN OF DURHAM. A short time ago the Dean of Durham presented 2,000*l*. (in stock) to the Durham County Hospital. To commemorate the dean's liberal gift, it was proposed to erect a stone gateway to the institution; but it has since been suggested that a convalescent ward should be established in connexion with the hospital. This latter proposal has been well received, and already about 1,500*l*. have been promised.

THE IMPERIAL GAS COMPANY.—A pamphlet titled "Facts on the Injurious Effects of the pending Bill of the Imperial Gaslight and Coke Company upon the Inhabitants of Fulham and Chelsea," by H. P. Ree, L.R.C., Phys., &c., printed for private circulation, gives, fresh evidence of the ferment which the attempt of the Imperial Gas Company to enlarge their premises in Fulham is exciting in that rural neighbourhood. It is certainly hard that gas-works which do not even light the district should be allowed to destroy the salubrity of its atmosphere.

THE MARGATE ALEXANDRA PHILANTHROPIC HOME.—Sir: In your number for March 17th, I see an item under the head of Provincial News, relating to the Margate Alexandra Philanthropic Home, in which Mr. Moffat is stated to be the consulting architect. I beg to say that he handed the matter over to me for a consideration. I made all the drawings, and suggested the alterations; it was my report which accompanied the plans; and I got up the perspective view, notwithstanding that my name has been cut from it, and those of Messrs. Hayward & Reeve, the "builders," added to it.—DAVID OLDFIELD.

IMPROVED HOUSES FOR WORKING MEN IN LEEDS.—The Leeds society for the erection of dwellings for working men who wish to be their own landlords held a public meeting on Monday evening, in Zion School, New Wortley. Ald. Carter was in the chair, and he, as well as Mr. J. Kitson, jun., Councillors Gaunt and Craven, and Messrs. Jas. Hole, J. Mayhall, and J. Bell, explained satisfactorily to the meeting how a frugal and industrious working man can get a comfortable house by very easy means, through a building society. The society have erected forty-two comfortable houses on their estate in Wortley, which are offered for sale, some at 225*l*. each, some at 195*l*., and some at 160*l*., exclusive of law charges. We understand that the society have now built ninety-two good houses in various parts of the town.

THE NORTHERN ENTRANCES, BIRKENHEAD DOCKS.—The works consist of three entrances from the river. The first, or north one of these, is 100 ft. wide, enough to admit the largest vessel afloat. The depth also is very considerable, being at high tide fully 30 ft., so that it will more than admit the largest vessels trading to the port. The second entrance is only 30 ft. wide, and is intended for the passage of flats and other small craft. To have to open the ponderous gates of the 100-ft. passage for small vessels would be a most undesirable labour. The third passage is 50 ft. wide, and is intended for the use of medium-sized vessels. The whole of these passages are furnished with massive gates, worked by hydraulic power. They debouch into a large intermediate dock of 7½ acres, which has been excavated to a depth of 17 ft. below the old dock sill, and from this dock corresponding passages have been opened into the Great Float.

BOROUGH ENGINEER OF PRESTON.—Mr. Newton, the borough engineer of Preston, has sent in his resignation to the corporation. We understand that he is going to Manchester, where he will enter into private practice as a civil engineer with Mr. Cawley, C.E.

A NEW ROAD SCRAPER.—A patent has been obtained by Mr. W. Smith, of Barnard Castle, for a newly-invented road-scraper. It is drawn by one horse, and is so constructed that it may be drawn along the road, delivering the mud on one side as it passes, and is calculated, if driven at the rate of three miles an hour, to clear upwards of 10,000 square yards of surface.

CRYSTAL PALACE.—For (this) Good Friday, the Sacred Concert provided for the afternoon's enjoyment includes *artistes* of high order;—Mr. Sims Reeves, Mr. Santley, Madame Rudersdorff, and Mr. Weiss, with Mr. Harper as trumpet solo, the full Band of the Crystal Palace Company, the Band of the Coldstream Guards, and a chorus. The great Show of Spring Flowers by Messrs. Cutbush, on a stage 300 feet long, all adds to the attractiveness of the Palace. For Easter great preparations are making.

ENFRANCHISEMENT OF COPYHOLDS.—The Copyhold Commission state in their report for 1865 that, in that year they completed 88 enfranchisements in clerical manors, 48 in collegiate manors, and 903 in lay manors. Since 1841 the Commission have completed 6,610 enfranchisements and commutations, the consideration consisting of 972,368*l.* for payments in full, rent charges amounting to 8,158*l.*, and 1,388 acres of land. Operations continue under the Universities and Colleges Estates Acts of 1858 and 1860, and the Commission have authorised in all 254 sales, 97 purchases, 38 enfranchisements, 18 exchanges, 29 applications for raising money, and 2 transfers of trust.

THE METROPOLITAN COBDEN MEMORIAL.—The site at the entrance of Camden-town, granted by the vestry, has been staked out for the Cobden Memorial, now rapidly progressing at the *atelier* of Messrs. Wills, sculptors, of the Euston-road. Messrs. Sewell & Sons, the contractors for paving from Highgate to Tottenham-court-road, have offered not only to fill in the site with concrete, but also to provide the granite base for the pedestal, which is 8 ft. square, free of cost, which liberal offer has been accepted. The model for the statue has been seen and approved of by Mrs. Cobden and her daughters, and the work is rapidly progressing, it is to be hoped, satisfactorily.

THE NEWSPAPER PRESS FUND DINNER.—We are glad to learn that this excellent institution now comprises about 220 members, including editors, managers, sub-editors, and Parliamentary, law, and general reporters, in London and various parts of the country; and that the number is rapidly augmenting. The accumulated fund now amounts to about 2,500*l.* It is earnestly hoped that, by means of donations connected with the annual dinner in May next, under the presidency of Earl Granville, K.G., this fund will be increased to at least 3,000*l.* The co-operation of the public generally is now solicited. The office is at 24, Cecil-street, Strand, and the secretary attends on Monday, Wednesday, and Friday, from three till five o'clock, to afford information and receive donations.

PUBLIC HALL FOR ST. LEONARD'S, SHOREDITCH.—The chief stone has been laid of a hall for municipal and other purposes in Shoreditch. The design has been prepared by Mr. Cæsar A. Long, and the execution has been entrusted to Mr. J. Perry, the cost being 20,290*l.* It has a frontage of 85 ft. facing Old-street-road, and a depth of 141 ft. The architecture is a combination of Corinthian and Doric architecture. On the basement are placed some of the necessary parochial offices, and the strong-room for the preservation of the parochial documents; on the ground-floor there are offices for the use of the vestry clerk and of the parochial surveyor, together with a sessions-room for the use of the district magistrates; and a council chamber, 59 ft. long, 30 ft. wide, and 29 ft. high, which will be the assembly-room of the select vestry. On the first floor is the great hall, capable of holding 1,800 persons. This will be the place of gathering for the mass meetings of the parishioners on all important matters of public discussion, the concert-room, the ball-room, the lecture-room of the locality. It is to be 96 ft. long, 79 ft. wide, and 39 ft. high. Sir John Thwaites laid the stone.

THE ART-UNION OF LONDON.—The Right Hon. Lord Houghton, D.C.L., has been appointed president of this association in place of the Right Hon. Lord Monteagle, deceased.

RIFLE PRACTICE.—Woods & Cocksedge, of Stowmarket, have just completed a set of their hematite iron targets, to be set up in the palace grounds at Osborne.

FINE ARTS, BERLIN.—An International Exhibition of Works of Fine Art will take place in Berlin, from the 2nd of September next to the 4th of November. It will include the works of painters, sculptors, architects, engravers, and lithographers.

LECTURE ON ARCHITECTURE, CHESTER.—Recently, Mr. Davidson delivered a very interesting lecture on the "History of Architecture," at the Chester Archæological Society, Alderman Meadows Frost presiding. A cordial vote of thanks was awarded to the lecturer.

GUN COTTON FOR BLASTING.—The extended use of this material has enabled the manufacturers to issue a new list, showing a large reduction in price; and they call attention in our advertising columns to the saving in time and cost effected by gun-cotton in blasting operations.

PAPER PIPES.—A few years ago I laid down a few lengths to convey water, relying upon the statements put forth. In my case (stiff clay), they have been an entire failure, having collapsed and become as soft as pap. Have any of your correspondents had experience of it in light soils?—J. J. MECHI.

THE SCIENTIFIC AND ART SOCIETIES OF GLASGOW.—At a recent meeting of the Institution of Engineers in Scotland a committee was appointed to co-operate with the committees from other societies in framing a scheme for the association of the scientific and art societies in Glasgow in one building.

THAMES SUBWAY.—A crowded public meeting has been held at the Literary Institution, Deptford, to take measures for promoting the formation of a subway for foot-passengers and vehicles under the Thames from Deptford-green to the Isle of Dogs. Sir Charles Bright, M.P. for Greenwich, occupied the chair; and it was stated that the plan was to have two iron tubes, 17 ft. in diameter, each tube to have a roadway for vehicles of 14 ft., and two pathways of 3 ft. 6 in. on either side of the roadway. Resolutions were adopted in accordance with the objects of the meeting, and a local committee was appointed to promote the carrying out of the project, the bill for which has been making progress in Parliament.

SELF-ACTING CLOCKS.—An application of electro-magnetism, as a motive power for clock-work, has just been made by Mr. Bright, of Leamington. The pendulum, the bob or ball of which consists of an electro-magnetic coil, is made to oscillate by means of a feeble current of electricity, thus beating true seconds, with a train of wheels only. One of the advantages of the system is said to be, that a number of clocks, in different parts, or even in different houses, can be connected together by a single wire, and the whole number will indicate the same time to a second. The clocks are of the simplest construction, and never need winding up. No acid battery is used. Mr. Bright has patented the plan; but the simultaneous movement of clocks by electrical means is not new.

THE WORKING MEN'S MEMORIAL OF THE LATE SIR ROBERT PEEL.—After the late Sir Robert Peel had carried the abolition of the corn-laws, as prime minister, in 1846, a fund was raised, by the penny subscriptions of 400,000 working men of Great Britain, to found a working men's memorial of gratitude to him. The fund so raised was invested, the University College of London being trustee, in order that the proceeds might be every year devoted to the purchase of books, maps, and other aids to knowledge, to be presented as gifts to any public library, mechanics' institution, reading-room, or literary and scientific institution in the United Kingdom, maintained by working men, or to which working men or youths have access gratis, or at a small charge. Such gifts have been made to forty-one institutions, in England, Wales, and Scotland. The trustee announces that for the present year four gifts, each in value 15*l.*, will be made. Applications should be sent in to the secretary of the college on or before the 10th of next month.

TENDERS

For the construction of the second section of the main drainage works, for the borough of Portsmouth. Mr. Lewis Angell, engineer:—

Nowell & Docwra	£31,524	0	0
Backhurst	31,000	0	0
Light	30,650	0	0
Thirst	29,542	0	0
Furniss (accepted) *	28,565	0	0
Lawrence	27,300	0	0

* Mr. Furniss is also constructing the first section of the main sewers, the two contracts amounting together to 75,365*l.*

For the erection of a public-house, at the corner of Malden-road and Grafton-terrace, Kentish Town, for Mr. J. Clarke. Mr. F. Fred. Holsworth, architect. Quantities supplied by Messrs. Richardson & Waghorn:—

Larter	£2,954	0	0
Tracey & Son	2,938	0	0
Eaton & Chapman	2,556	0	0
Manley & Rogers (accepted)	2,517	0	0

For residence, at Leighton Buzzard, Beds. Mr. Frederick Gotto, architect:—

Groom & Gibbons	£735	0	0
Hobson & Taylor	697	0	0
Garside	676	10	0
Miles	669	0	0
Nash & Adams (accepted)	602	5	0

For Farm-house, at Horton, Bucks. Mr. Frederick Gotto, architect:—

Chappell	£1,059	10	0
Miles	995	0	0
Hobson & Taylor	984	0	0
Honour	947	0	0
Garside (accepted)	904	10	0

For the erection of national schools, at Bromham, Wilts. Mr. Weaver, architect:—

Coakham	£1,009	0	0
Pickard	889	19	2
Downing & Son	779	0	0
Wall & Hook	700	0	0
Mullings (accepted)	690	0	0

For erecting Baptist chapel, Buckhurst Hill. Mr. Joseph Tanner, architect:—

Egan	£1,250	0	0
Kirkby	1,065	0	0
Barker (accepted)	880	0	0

For house and offices, at Grigg's Hill, Ditton, Surrey, for Mr. R. Taylor. Mr. J. J. Collings, architect:—

Callingham	£888	0	0
Welling	615	0	0
Bent	598	10	0
Alderton & Son (accepted)	561	5	11

For villa residence, at Maidenhead, for Mr. J. B. Burke, C.E. Mr. Robt. A. Potts, architect:—

Snowball	£819	0	0
Newell	445	0	0
Mickley (accepted)	382	0	0

For the erection of bacon-curing works, offices, and other buildings, at Cirencester, for Messrs. Cole & Lewis. Mr. William Clissold, architect:—

Wall & Hook	£5,687	0	0
Jones & Sons	5,350	0	0
Newcombe	4,200	0	0
Barrett	4,150	10	0
King & Godwin	3,675	0	0
Freeman	2,850	12	0
Bridges (accepted)	2,641	0	0

For the erection of dwelling-house and trade premises, at Lansdown, Stroud, for Mr. J. F. Bird. Mr. William Clissold, architect:—

Hawkins, Hunt, & Dudbridge	£613	0	0
Wall & Hook	580	0	0
Freeman	518	13	8
Fenner	484	0	0

For new granaries, for Mr. John Donney, jun., Wandsworth:—

Thornton	£2,755	0	0
Lathy, Brothers	2,695	0	0
Atkinson	2,522	0	0
Brighton	2,515	0	0
Parsons	2,494	10	0
Adamson & Sons	2,297	0	0
Easton, Brothers	1,885	0	0

For alterations and additions to premises, No. 4, Aldermanbury Postern. Mr. T. J. Hill, architect:—

Colls & Sons	£928	0	0
Axford & Whillier	905	0	0
Henshaw	788	0	0
Sabey	770	0	0
Turner & Sons	699	0	0

For the erection of a warehouse, in Camden Town, for Messrs. Muggridge & Alph. Mr. A. E. King, architect:—

Dove, Brothers	£6,255	0	0
Maney	5,729	0	0
King & Sons	5,249	0	0
Lawrence & Baugh	4,960	0	0
Carter	4,770	0	0
Scrivener & White	4,535	0	0

TO CORRESPONDENTS.

B. A. P.—T. F.—D.—H. C. W.—F. R. C.—T. J. H.—J. W. M'G.—J. J. C.—W. C.—A. M.—G. W.—F. G.—R. A.—F.—L. A.—W. S.—J. W. H.—W. S.—J. F. M.—I. R.—J. H. (we cannot interfere *ex parte*).—M. D. (ditto).—C. F. (ditto. Apply to an architect).—Edenbridge (the difference of practice in respect of *scaffolding* in England and America has already been commented on in our pages).—A. & Co. (received).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings rests, of course, with the authors.